A TWO-STUDY INVESTIGATION OF THE ROLE OF MORPHEMIC AWARENESS IN LITERACY DEVELOPMENT AMONG NYANJA SPEAKING CHILDREN IN ZAMBIA

A Dissertation

by

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ABSTRACT

Students in Sub-Sahara Africa face a deluge of academic challenges that hinder literacy development. Post-colonization remnants in Zambia are evident in its educational system that, until recent changes in educational language policy, used English in academic contexts, although students primarily use native languages (e.g., Nyanja) in all other settings. Zambia has one of the lowest student achievement rates in Sub Sahara Africa, as well as the world. Research demonstrates that morphemic awareness underpins and facilitates reading, vocabulary, spelling, writing, and overall literacy development. Such research sought to understand the extent to which 206 Zambian 6^{th} grade multi lingual students tapped into their English morphemic knowledge to help them with reading comprehension and writing tasks.

Students were evaluated with a range of standardized measures and a researcher-created writing task. Hierarchical multiple regression analyses revealed that morphemic awareness had a 2.2% predictive ability above other predictors in reading comprehension (ΔR^2 = 2.2%, ΔF (3,1) = 31.147, $p < .001$; study 1) and 2.3% in writing ability (ΔR^2 = .2.3%, ΔF (3,1) = 19.977, $p < .001$; study 2). Morphemic awareness, (β = .438, t = 5.581, p <.001; study 1) and (β =.413, t =4.470, p <.001); study 2), was shown to have the strongest relationship to both reading comprehension and writing ability, respectively. These results confirm the critical role of morphemic awareness in literacy development, and it can be argued that morphemic awareness needs to be taught explicitly and systematically.

DEDICATION

I dedicate these dissertation studies to the children of Zambia in hopes that more research will be conducted and effective interventions will be implemented to facilitate literacy growth.

I thank God, who opens doors to those who seek to enter and to those beautiful people in my life who believed in me in spite of the challenges I faced. My parents instilled in me as a young child the value of education, and my mother provided a strong example of learning and pursuing degrees. My father's work ethic and spirit of never giving up provided me the courage and energy to always finish what I start. My husband, Roberto, helped put my desire to pursue my PhD into action following his example as a doctoral student. My daughters, Robin Hadasa and Madison Liat, inspired me every step of the way. My grandparents, Johnni and Hubert Breland, and Virgil and Eloise Hamrick, gave me many opportunities to dream as wide as the ocean and as tall as a mountain in the Himalayas.

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CHAPTER I

INTRODUCTION

Most of the world's population lives in nations amid various degrees of development, such as Zambia. In fact, populations in poor and under-developed countries increase greater than in developed countries (Population Reference Bureau, 2008). That is, there are more children living in the developing nations. The irony, however, is that nearly all educational research is conducted in advanced and developed countries. Consequently, the research community is limited in their understanding about children's abilities and skills in the developing world and especially Africa (Pritchett, 2001).

Across Africa, students struggle with basic literacy achievement. Most students in Sub-Saharan African countries face ongoing maladies, such as high incidence of HIV, environmental hazards, and limited resources to maintain good health. Zambian school children, more often than not, learn in overcrowded classrooms with a disproportionate ratio of teachers to students (i.e., 50-80 students to one teacher) and have insufficient books and educational resources (Spaull, 2012). Teachers, in general, are not well prepared to teach the diversity of learners and plethora of learning challenges that students bring to the classroom (Thomas & Thomas, 2014). English, the language of instruction or academic language, challenges students' academic performance, since nearly all Zambians speak one or more Bantu languages (e.g., Nyanja or Bemba) in most social contexts. According to the Southern African Consortium for Monitoring

Educational Quality (SACMEQ, 2010) Zambian 6th grade students in 2010 performed nearly last in comparison to other Sub Saharan countries in both reading and mathematical skills.

Recently (i.e., January 2014), Education Curriculum Framework (Curriculum Development Centre, 2013) began to implement the first stage of a bilingual model that values and promotes native language instruction and literacy development. The bilingual model uses exclusively native language instruction and literacy development in 1st through 4th grades before transitioning to all English instruction in Grade 5. This model positively promotes the seven major Bantu languages spoken throughout Zambia, with Nyanja and Bemba being the two most common. This change in language policy may help mitigate unfavorable results. Tambulukani and Bus (2012) found that under-developed proficiency in the language of instruction is strongly associated with approximately 40% illiteracy rates across the continent of Africa where multiple languages are spoken. Research, primarily from the western world, shows that native language literacy (L1) offers a greater latitude to build knowledge, conceptual frameworks and literacy skills that will transfer to reading in a second language (L2), (Thomas & Collier, 1997; Cummins, 1981a). Research also supports literacy proficiency in L1 highly correlates with L2 literacy development (Thomas & Collier, 1997; Krashen & Biber, 1988) and that bilinguals tend to be more sensitive to language structures in general (Kuo & Anderson, 2012).

The move to implement native language literacy proficiency in 1st through 4th grades and introducing English literacy in 5th grade began after the present study was conducted. Therefore, the data in this study reflect students who received native language instruction in 1st grade only. In order to understand literacy development in Zambia, the following studies concentrated on 206 Zambian multilingual 6th grade students' metalinguistic development, specifically morphemic awareness and its predictive role in reading comprehension and writing at the sentence level. In the following paragraphs, a more elaborate explanation is given germane to morphemic awareness and its crucial role in literacy development.

Words are made up of smaller units such as phonemes and morphemes. Morphemes are those units that are embedded with syntactic and semantic information. Children increase their understanding of morphemes by improving their morphemic awareness (MA) or an awareness of and ability to think about word structure and how that structures change. A growing body of research establishes the unique contribution of MA in literacy development (Anglin, 1993; Bowers & Kirby, 2011; Carlisle, 2000; Deacon & Dhooge, 2010; Nunes & Bryant, 2006). MA requires a certain level of sophistication of linguistic skill to analyze internal structures in combination with orthographic, syntactic, and semantic knowledge and develops as a result of phonological, syntactic and semantic processes (Adams, 1990). Last, MA extends and develops as a child increases literacy abilities, and most likely maintains a reciprocal relationship with other literacy skills, such as reading and vocabulary development.

Mounting evidence strongly supports the predictive power of morphemic awareness in reading and writing (Bowers, Kirby, & Deacon, 2010; Kirk & Gillon, 2009; Kuo & Anderson, 2006), promotes word decoding (Carlisle & Stone, 2005;), vocabulary acquisition (Anglin, 1993; Goodwin, Lipsky & Ahn,2012 ; Kieffer & Lesaux, 2012), reading comprehension (Carlisle, 1995, Kirby, Deacon, Bowers, Nagy, Berninger, & Abbott,2006; Siegel, 2008), spelling outcomes (Apel & Lawrence, 2011; Nunes, Bryant, & Bindman, 1997) and most recently written expression (Apel & Werfel, 2014; Green, McCutchen, Schwiebert, Quinlan, Eva-Wood & Juelis, 2003). The degree of MA is highly affected by exposure to language both oral and printed language. In its own right, written texts offer a greater concentration of less frequent, morphologically complex vocabulary.

Nagy and Anderson (1984) documented that upper elementary children in the United States typically encounter 88,500 words while reading, and between 60 to 80 per cent of the vocabulary they acquire will come from morphologically complex words or complex words. Proficient English speaking students' understanding of complex words typically expands about 14 words per day between 1st and 3rd grades (Anglin, 1993). Nagy and Anderson (1984) also maintained that children greatly benefit by knowing the constituent components of morphologically complex words, (i.e., roots of words and suffix meanings) to facilitate vocabulary and syntactical markers which in turn boost comprehension of more complex written texts.

Both studies focus specifically on derivational morphology which involves changing a word´s syntax or part of speech in addition to the base word's meaning (*explain-explanation* a verb transforming into a noun by adding a nominalizing morpheme). Derivational endings are more numerous (i.e., *-able, -ment, -ate, -ize, -al*) and frequent with less exposure until late elementary years and undergo phonological and orthographic shifts affecting syntactic and semantic aspects (e.g., *wide*-width). Moreover, derivational morphemes are exclusively selected for certain base morphemes, therefore requiring a child to be sensitive to a word's architecture. Take for instance the suffix *–able;* it attaches to verbs that then transforms into an adjective as in *manage - manageable*.

Given the critical role that MA plays in literacy development and the paucity of research involving children in Sub-Sahara Africa of Bantu languages learning in academic English, further investigation is warranted. Both dissertation studies seek to understand the relationship that English MA has with reading and writing ability among English language learners whose academic language abilities may not fully support their literacy learning. The hypothesis that drives both studies states that better developed morphemic awareness will augment reading comprehension and sentence writing ability.

CHAPTER II

IMPACT OF MORPHEMIC AWARENESS ON READING

Overview of Post-Colonial Literacy Development

Still in the 21st century, basic literacy acquisition worldwide remains an ongoing concern. Recently, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) released *Education for ALL* (2014), a report that estimated nearly 250 million children around the globe need support in learning to read. The largest number of those children is living in Sub-Sahara Africa and faces various environmental factors that jeopardize development in critical areas such as cognition and the social-emotional domain. Above all, pervasive poverty impacts children at every level including survival rates, health, nutrition, cognitive development, and education (Grantham-McGregor et al., 2007).

Children in the Sub Sahara have consistently experienced a downward trend in achievement, especially in strategic reading and literacy skills. Results from the *Performance in International Reading Literacy Study* (PIRLS), an international review that provides data on literacy achievement among children ages 9 to 10, reported that South Africa ranked last among 40 countries involved in the assessment (Mullis, Martin, Foy, & Drucker, 2012; Twist, 2007). Although Zambia was not included in this study, it is part of the Sub Sahara region; the PIRLS results serve as a reference point to better understand general literacy outcomes in the region. The *Southern and Eastern*

Africa Consortium for Monitoring Educational Quality (SECMEQ; 2010) provided an even clearer picture of Zambia's reading outcomes among 6th grade students. They found that 44% of Zambian 6th graders were functionally illiterate (performing at pre- or emergent reading levels) and 29% exhibited basic reading skills. Few Zambian 6th graders exceeded basic reading levels; 15% achieved a *reading for meaning* level and only 12% attained a more advanced level (i.e., inferential, analytical, or critical reading levels). Similar outcomes were noted in nearby countries (Makuwa, 2010). In short, Zambia along with other Sub Saharan countries face mounting challenges in literacy acquisition among school-aged children.

Factors Affecting Zambian Education

Compulsory education in Zambia since 2002 begins at age seven, and school attendance is required for seven years (Ministry of Education, Science, Vocational Training and Early Education, or MESVTEE). The Ministry of Education (1996) reported that primary grades through grade four are getting 3.5 hours instructional time compared to 6.7 hours for the average elementary student in the United States in 2007-2008 (National Center for Education Statistics, 2007-2008). According to UNESCO (2014), students in primary basic schools (grades 1-7) increased from almost 1.6 million students in 2002 to close to 3 million in 2010 which resulted in ushering in large numbers of inexperienced, beginning teachers to meet the demand (Thomas, Thomas, Lefebvre, 2014). Many of these teachers enter Zambia Teacher Education Course where they study for one year at a teacher training college and then pursue a teacher practicum in the second year. The practicum, however, many times evolved quickly into a full time

teaching job but without the support, knowledge and experience to do it well (Thomas & Thomas, 2012). Many beginning teachers have to learn the native language of their students specifically in rural areas and have to adjust and/or differentiate the curriculum for low achieving students (Croft, 2006).

Most schools, furthermore, are limited in resources, which starkly contrasts with most reading studies conducted in developed countries. Chalkboards, library books, paper, essential school supplies are scarce. Textbooks, too, are limited, but many times are inaccessible from students to prevent damage or loss, and at times are not used because teachers do not know how to use them (Ministry of Education, 1996).

Other hardships include class size. For instance, a typical sixth grade classroom size was 46 but can be as high as 70 or 80 pupils in one classroom (Musonda & Kaba, 2011, Thomas, 2008). Moreover, absenteeism rates are high and lack of neighborhood schools causing children to walk long distances to their schools affects regular attendance (Maimbolwa-Sinyangwe & Chilangwa, 1995). Poverty at 60.5% and HIV/AIDS at roughly 14% among people ages 15-49 continuously pose difficulties for both students and teachers (Central Statistical Office, 2012).

Linguistic Topography of Zambia

English is the official language as a result of English colonization that lasted from 1924–1964. Although many people speak varying levels of English proficiency, tribal languages are widely spoken. Bemba, Lozi, Luanda, Luvale, Nyanja, Tonga, and Tumbuka are the seven main languages spoken among 75 tribes, although there are 70

tribal languages (Ohannessian & Kashoki, 1978). In addition to English, there are seven dominant Bantu languages taught and used in Zambian schools. Nyanja was the dominant language for the students participating in this study. Nyanja, a Bantu language, ranks as the second most widely spoken language in Zambia, specifically among urban population, and Zambians fluently speak at least one or more of the Zambian languages but not always English, the language of instruction in schools (Marten & Kula, 2008). However, the multi-linguistic parameters of this country do not guarantee proficiency in the language of instruction, be it English or another Bantu language (Kaani, 2013).

Nyanja and English orthographies share the same letters (Chimuka, 1978). However, Nyanja and English are polarized regarding transparency or consistency of grapheme to phoneme mapping. English orthography is highly irregular, or opaque, (Share, 2008) because of its highly inconsistent grapheme-phoneme mapping. A salient characteristic of Nyanja's orthography, like other Bantu languages, is that it involves mapping of graphemes to phonemes and is considered highly transparent.

Nyanja is considered a tonal language made up of 29 graphemes categorized into five vowels and 24 consonants (Chimuka, 1978). Mchombo (2004) maintains that Nyanja involves low and high tones, although diacritical markers are not used to denote high and low tones. Just like in English, Nyanja's vowels include a, e, i, o, and u. Moreover, most words are categorized as consonant-vowel (CV). Some subtle differences exist among consonants; Nyanja consonants include b, c, d, f (pf), g, h, j, k, l, m, n, p, r, s (ts), t, w, y, and z (dz). Unlike English with 31 digraphs (e.g., bl, fr, pl, st, wh) and more representative of Bantu languages, six digraphs (ph, th, ch, kh, bv, ng' and

mŵ) are included in the linguistic architecture of Nyanja (Chimuka, 1978). When considering literacy development among Zambians, it should be noted that a common denominator between English and Nyanja is the alphabetic writing orthography. However, Kaani (2013) points out that word and spelling patterns as well as tones and stress in Nyanja are markedly different than in English.

Language of Instruction in Post-Colonial Zambia

School children typically use Nyanja or their native language in nearly all social contexts. English, however, is not used pervasively outside of academic contexts. According to Thomas and Thomas (2014), many times teachers resort to using a local language, such as Nyanja or Bemba, to clearly teach ideas and concepts that otherwise becomes convoluted in English.

After gaining independence from Great Britain in 1964, the English only policy began with UNESCO strongly supporting English as the language of instruction (UNESCO, 1964). However, Zambian students have been performing poorly in reading achievement for decades in both local languages and English (Kaani, 2013). Some of the first reports in the 1970s on English and local language reading skills presented grim outcomes such as 6% of students not being able to read any words on a word recognition test that came from English textbooks (Serpell, 1978) Lastly, the South African Consortium Measuring Educational Quality (SACMEQ; 2010) placed Zambia 13th of the fourteen Sub Sahara participating countries. These results demonstrate a need to implement more evidenced based interventions that take into account linguistic diversity and reading gaps.

Recent Efforts Involving Literacy Development in Zambia

Resulting from the 1990 World Conference on Education for All, the language of instruction became a driving motivation for policy changes in the Zambian government. Growing evidence from multiple studies strongly suggest that native language instruction would promote children's literacy acquisition and development in a multi-linguistic context (Cummins, 1989; Kelly & Kanyika, 2000; Serpell, 2007; Snow, Burns, & Griffin, 1998). In an effort to better understand levels of reading proficiency among school children in Zambia and Malawi, the Overseas Development Agency funded research to examine local language and English reading abilities in school children in grades 3, 4, and 6 from five schools in both urban and rural settings. The results signaled that the majority of the students were two grades or more below in reading ability. Furthermore, results were low in both the Zambian language and English, thus implicating that children were struggling with reading ability, not language interference.

As a result of these efforts, Primary Reading Program was implemented in 2002 in government run basic schools. In grade 1 with *New Breakthrough to Literacy* (NBTL), students developed native language skills and oral English skills. Then, in grade two students used *Step in to English* (SITE) which linked native language literacy skills to English literacy development. Lastly, students in grades three to eight used Read on Course (ROC) to support bi-literacy skills.

In spite of policies crafted to strengthen and maintain bi-literate proficiencies, the curriculum did not fully support the necessary linguistic transitions and goals in the long run (Tamnulukani & Bus, 2011). Chingo and Chisengele (2004), for example, found that

children were not learning to decode in a beginning reading book in Tonga (i.e., one of the seven major Bantu languages used in schools). They also found that teachers were teaching children to read whole words in English contrasted with learning to decode. Furthermore, the study exposed other ineffective teaching practices such as some teachers consistently teaching the conventions of writing in English only. However, students were expected to be able to transfer and use English writing conventions to their Zambian written language, too, without modeling.

Shift in Language of Instruction

Beginning in phases in January of 2014, the Education Curriculum Framework (Curriculum Development Centre, 2013) made a drastic change with regard to language policy. The bilingual model uses exclusively native language instruction and literacy development in Grades 1–4 before transitioning to all English instruction in Grade 5. Native language literacy (L1) offers a greater latitude to build knowledge, conceptual frameworks and literacy skills that will transfer to reading in a second language (L2), (Collier and Thomas, 1992; Krashen & Biber, 1987). Research supports L1 literacy proficiency is highly correlated with L2 literacy development (Collier & Thomas, 1995; Cummins, 1989) and that bilinguals tend to be more sensitive to language structures in general (Kuo & Anderson, 2012).

To further support these efforts that Zambia is making in phases, research confirms that the exposure to one or more language creates neural linkages in the brain that control language production and comprehension, and the brain does not have preferences for one language over another (Abutalebi & Green, 2007; Bialystok, 2008).

Exposure to one or more languages ignites a "series of connections between prefrontal cortex, anterior cingulate cortex, inferior parietal region, and basal ganglia, all of which are implicated in language production for bilinguals" (Bialystok, 2008, p. 7). That is, language skills originate in the same area of the brain (receptive and production). Consequently, these skills are used distinctly in each language and not relearned. This explanation of the bilingual brain parallels with Lambert's "additive bilingualism." These findings clearly support a bilingual model that supports children learning in their native language and introducing English literacy, too. The brain welcomes languages. The move to build native language literacy and introduce English literacy later began after the present study was conducted. Therefore, the data in this study reflects students who were taught with one year of native language instruction.

In the next section, morphemic awareness and literacy skill development will be discussed highlighting critical components for literacy in L1 (native language) and target language (L2 or English for Zambian children) that students need in order to learn to read proficiently.

Morphological Awareness and its Crucial Role in Literacy

By definition, morphemes are word units that carry semantic and syntactic information. To clarify the terminology, some morphemes are monomorphemic words (i.e., friend, bus); while morphologically complex words include more than one bound morpheme, specifically referring to affixes and stems. For example, the word *useless* consists of two morphemes: *use* (root word that can stand alone) and *less* (suffix changes the noun to an adjective or adverb also known as a bound morpheme). As Kuo and

Anderson (2006) point out, the nature of a morpheme is "…the pairing of semantic information with the phonological representation …" (p. 161).

Children learning to read are expected to increase their understanding of morphemes, and they do this by improving their morphemic awareness (MA). A growing body of research establishes the unique contribution of MA in literacy development (Anglin, 1993; Bowers & Kirby, 2011; Carlisle, 2000; Deacon & Dhooge, 2010; Nunes & Bryant, 2006). Morphological awareness and morphological development are two distinct entities that describe the process of understanding morphemes. Morphological development is the ability to use morphologically complex words in naturally occurring speech (McCutchen, Logan, & Biangarde-Orpe, 2009). Specific to this study, morphological awareness is regarded as children having a "conscious awareness of the morphemic structure of words and their ability to reflect on and manipulate that structure" (Carlisle, 1995, p. 194). MA requires a certain level of sophistication of linguistic skill to analyze internal structures in combination with orthographic, syntactic, and semantic knowledge and develops as a result of phonological, syntactic and semantic processes (Adams, 1990). Last, MA extends and develops as a child increases literacy abilities, and most likely maintains a reciprocal relationship with other literacy skills.

Research has demonstrated the strong role of developed phonological awareness skills in learning to read and write (Torgesen, Wagner, & Rashotte, 1994). However, evidence shows that understanding word parts or units and their ability to transform syntax and meaning predicts decoding better than phonological awareness (Mahoney,

Singson, & Mann, 2000). Indeed, mounting evidence strongly supports the predictive power of morphological awareness in all literacy skills (Bowers, Kirby, & Deacon, 2010; Carlisle, 2003; Kirk & Gillon, 2009; Kuo & Anderson, 2006), impacts word decoding (Siegel, 2008; Singson, Mahony, & Mann, 2000), vocabulary acquisition (Anglin, 1993; Carlisle & Fleming, 2003;Goodwin, Lipsky & Ahn,2012 ; Kieffer & Lesaux, 2012), reading comprehension (Carlisle, 1995, Kirby, Deacon, Bowers, Izenberg, Wade-Woolley, & Parrilla, 2012; Nagy, Berninger, & Abbott,2006; Siegel, 2008), spelling outcomes (Apel & Lawrence, 2011; Nunes, Bryant, & Bindman, 1997) and most recently written expression (Apel & Werfel, 2014; Green, McCutchen, Schwiebert, Quinlan, Eva-Wood & Juelis, 2003). Moreover, Carlisle's (2010) systematic review based on 16 studies suggested that morphological instruction supports literacy through especially phonology, orthography, and word meaning, and proposes a shared relationship between morphological awareness and reading. Simply put, readers use their MA to determine the meanings of complex words. The degree of MA is highly affected by how much exposure children receive from language both spoken and written texts. In its own right, written texts offer a greater concentration of morphologically complex vocabulary. Accordingly, as children advance in reading comprehension and exposed to more morphologically complex words, morphological awareness is imperative to sustain literacy growth (Carlisle, 2003).

Nagy and Anderson (1984) documented that upper elementary children in the United States typically encounter 88,500 words while reading. Moreover, between 60 to 80 per cent of the vocabulary they acquire will come from morphologically complex

words. More specifically, proficient English speaking students' knowledge of morphologically complex words grows by approximately 14 words per day between grades three and four (Anglin, 1993). Accordingly Nagy and Anderson (1984) argued that children will greatly benefit by knowing the constituent components of morphologically complex words, (i.e., roots of words and suffix meanings) to facilitate vocabulary acquisition and therefore helping them comprehend increasingly more complex written texts.

Inflectional and Derivational Morphemic Acquisition

Inflectional morphology is involved with the systematic markings for gender, number, tense, and person and are high frequency with fewer endings (i.e.., *talk-talked; one plate-two plates; I walk-she walks*). Berko's (1958) classic "wug" study established that preschool children have a working knowledge and ability to manipulate and apply inflectional markers and improved this ability from kinder to first grade. This study was also reproduced in several Alphabetic languages such as Russian, Serbian-Croatian, Turkish, and French and the findings were the same.

Derivational morphology, on the other hand, implicates changing syntax or part of speech in addition to a base word's meaning (*explain-explanation* a verb transforming into a noun by adding a nominalizing morpheme). Derivational endings are more numerous (i.e., *-able, -ment, -ate, -ize, -al*) and frequent with less exposure until late elementary years. Derivational morphemes undergo more shifts both phonologically and orthographically which affects the syntactic and semantic aspects, too. Moreover, derivational morphemes are exclusively selected for certain base morphemes. Take for

instance *–able;* it attaches to verbs to produce adjectives. Derivational morphology, however, takes a different and longer trajectory.

Factors Affecting Acquisition of Morphemes

Productivity and constraints offer explanations concerning the acquisition rate of morphemes and how they facilitate reading development (Anglin, 1993; Carlisle & Stone, 2005; Deacon, Campbell, Tamminga, & Kirby, 2010). Productivity refers to the number of combinations between the stem and affixes resulting in the formation of words (i.e., *expand-expansive-expansion*). However, there remains other mediating variables associated with productivity that Carlisle and Katz (2006) explored involving stem and morpheme familiarity and found that grade level, age of child, frequency of word family, total words in a word family, and reading skill all contribute to morphologically complex word reading. High frequency stems coupled with low frequency word families (i.e., *intense = intensive, intensity, intensely, intensify, intensified, intensifying, intensities, intensively*), lessens the potential for word recognition. High productivity of a base word and high familiarity help activate morphological processing to facilitate word reading. The combination of a low productive base and high frequency suffix (i.e., *honest-honesty*) increases a reader's ability to read the word as opposed to a less familiar word base (i.e., *serene, serenity, serenely*).

Morphemes and Reading Development

Out of all of the morphological aspects, derivational morphology is studied the most because it relates to reading achievement. Reading and language development necessitates the ability to examine language and to think about its structural properties. Considerable attention and vigorous research efforts have been given to phonological awareness as one of the five elements of effective reading instruction (National Reading Panel, 2000). In fact, phonological awareness assumes a dynamic function in the learning of alphabetic languages such as English, Spanish, and Nyanja. Readers comprehend written texts when they convert phonemes (distinct units of sounds) and map them onto semantic information (Bowers, Kirby, & Deacon, 2010). Once children begin reading with greater levels of proficiency, morphemes facilitate their comprehension by providing semantic and syntactic information (i.e., *sadly* – the *ly* denotes an adverb). This makes morphemes integrally attached to other language components. Carlisle (1995) asserts that morphemes "provide a more general index of metalinguistic capability" (p. 192).

Studies empirically demonstrate MA's role in learning to read. In a study conducted by Apel, Wilson-Fowler, Brimo and Perrin (2012), morphological awareness contributed above phonological awareness and vocabulary in helping second and third graders to decode, spell and comprehend. Deacon and Kirby (2004) found that morphological tasks measured in 2nd grade were strong predictors of 4th grade reading comprehension. In a study involving students between 8th and 9th grades, Nagy, Berninger, and Abbott (2006) reported that morphological awareness promoted word

decoding and other aspects of literacy. Similar findings in a study conducted by Kieffer and Lesaux (2007) also found that children after third grade begin to develop the ability to manipulate morphologically complex words with greater frequency. These findings maintain that MA is integral in learning to read proficiently.

From a psycholinguistic perspective, morphological awareness fundamentally helps readers organize mental lexicons. Psycholinguistic studies demonstrate that MA in alphabetic languages, such as English and Nyanja, supports the recognition of consistent root spellings across words. This recognition then helps readers to process complex words by parsing constituent morphemes together (Deacon & Dhooge, 2010). This further suggests that words are likely stored according to morphological organization (Kirby, Deacon, Bowers, Izenberg, Wade-Woolley, & Parrilla, 2011). Along the same lines, Taft (2004) proposed that morphologically complex words get filed in one of two ways, whole word (*farmer*) or as separate morphemes (*farm,* er). Moreover, these morphemic associations serve as bridges to other words (i.e., *farm*ing, driv*er*, teach*er*). Therefore, when a reader comes across unknown whole words, it is possible that the constituent morphemes offer clues to meanings and pronunciations. The implications of these findings imply that children with greater morphological awareness may boost their ability to acquire and retain complex words.

Vocabulary and Morphological Awareness

Children's literacy development depends greatly on developed vocabulary skills (Snow & Kim, 2006). Several studies have established that latitude and depth of students' vocabulary underpin decoding and comprehension abilities (Cunningham &

Stanovich, 1998; Kieffer & Lesaux, 2012; RAND Reading Study Group, 2002). More specifically, vocabulary contributes to decoding ability of unfamiliar words (Ehri, 2005). Some researchers hypothesize that knowing a word involves knowing the definition, understanding various meanings of the word in different contexts, and identifying morphological forms to positively impact reading comprehension (Carlisle & Katz, 2006; Stahl & Nagy, 2006). Studies have also examined the impact of SES on children's vocabulary skills in developed nations, namely the United States. A seminal report from Hart and Risley (1995) documented language-related distinctions among children from varying levels of socio-economic conditions. The average number of known words among four year olds from families living in lower socio-economic conditions was 500, compared to an average of 1100 known words among same-aged children from professional families. A similar study examined the relationship between amounts of time children engaged in reading and anticipated exposure to words. Children reading less than one minute per day over the span of a year would be exposed to approximately 8,000 words; engaging in 4.6 minutes per day would result in roughly 282,000 words; and reading 20 minutes per day would increase to 1,800,000 words per year (Shaywitz, 2003). Research has established that vocabulary is strongly correlated with reading development and achievement in the beginning years of formal education. Primary grade students' vocabulary skills predicted reading ability among children in 4th and 5th grades (Chall, Jacobs, & Baldwin, 1990; Cunnningham and Stanovich, 1997). Earlier studies have consistently shown that children, certainly ELLs, beginning school with weak vocabulary skills tend to polarize more each year from students with stronger vocabulary

skills to support comprehension (Baker, Simmons, & Kame'enui, 1998; Stanovich, 1986). Vocabulary size and morphological awareness are highly related in most languages (Anglin, 1993). English morphological awareness typically develops greater in upper elementary and middle school years (i.e., around ages 9-13; Berninger, Abbott, Nagy & Carlisle, 2010). Consequently, well developed MA underpins a student's ability to read increasingly complex texts. Good readers, for example, will connect *depart* and *departure.* Nevertheless, children many times do not see *harm* in *harmful* and *harmed* (Deacon et al., 2010) or parse out words automatically suggesting that stems and affixes should be taught explicitly. According to Nagy and Anderson (1984), MA helps readers make about three additional word associations to one newly learned word contrasted with memorizing 170,000 to 200,000 morphologically complex words they will encounter in academic contexts. In addition to exposure, as MA develops stronger, readers depend less on phonological skills in reading (Carlisle, 2010).

Literacy Struggles Associated with English Language Learners

Research centering on the achievement of students who are learning in a second or non-native language makes a distinction between social and academic language (August & Shanahan, 2006; Bailey, 2007; Snow & Uccelli, 2009). To support proficiency in reading comprehension and writing ability, ELLs need well developed academic language (Fang, 2010; Schleppegrell, 2012). Academic language is the language students and teachers use in school and associated with content specific vocabulary, reading, writing, assessments, and ability to orally explain and discuss content related material. It is the language in which students think critically and defend

their thoughts and opinions, too. Studies conducted mainly in the western world have determined that ELLs whose primary home language is not English coupled with low SES family status tend to struggle greatly with underdeveloped academic language and reading proficiency (August & Shanahan, 2006). Thus, it is alarming that most school children in Zambia speak one or more Bantu languages at home and live in abject poverty, yet they are expected to achieve academically in English. Kieffer and Lesaux (2008) found that ELLs struggle with both oral and written English, affecting morphological acquisition development.

To better understand the crucial role of early oral exposure, specifically listening comprehension, a study conducted by Tabors, Snow, and Dickenson (2001) established the predictive value of kindergartners' narrating abilities in reading comprehension in later grades. By looking at a sequence of pictures, the students were expected to narrate the story. The results showed that kindergartners' ability to sequentially narrate a story was significantly correlated with their ability to comprehend in fourth and seventh grades. Similar results demonstrated that English listening comprehension skills predicted English reading comprehension achievement among fourth grade Spanish speaking ELLs (Proctor, Carlo, August, & Snow, 2005). Research additionally demonstrates that early oral exposure in the academic language or language of instruction has a predictive and significant relationship with the ability to comprehend written texts later on. Moreover, the Simple View of Reading (Hoover & Gough, 1990) necessitates proficiency in language comprehension in order for word reading to develop well.

A growing number of studies have been conducted involving literacy acquisition among English Language Learners (ELLs) mainly in the western world (Gersten, Baker, Shanahan, Linan-Thompson, Collins, & Scarcella, 2007; Vaughn, Cirnio, Linan-Thompson, Mathes, Cardenas-Hagan, et al.,2006). Recently, more studies are examining vocabulary acquisition for ELLs (Kieffer & Lesaux, 2012). Vocabulary acquisition creates vast disparities between ELLs and their fluent English speaking classmates (Snow & Kim, 2007). The researchers maintained that in order to gain equivalency with their native English speaking peers, they must increase their vocabulary exponentially. To help with this, mounting evidence reveals that direct instructional approaches that increase number of words and word associations as well as variations of word meaning in different contexts have been found effective in facilitating reading comprehension (Gersten, et al., 2007). Along the same lines, ELLs need strategies to augment their ability to comprehend texts with various degrees of vocabulary complexity and concept density (Cummins, 2007). Empirical evidence shows that interventions including a MA component among ELLs provide the literacy support to help them catch up and increase literacy achievement (Carisle, 2010; Goodwin, 2011; Lesaux, Kieffer, Faller, & Kelley, 2010).

Bowman-Perrot, Herrera, and Murry (2010) point out that ELLs benefit from being aware of parts of words in L1, such as morphemes that carry semantic and syntactic information. In turn, they are more likely to transfer this awareness to L2 facilitating and increasing their comprehension of written texts. Even when L1 and L2 do not share many commonalities, such as word roots as evidenced with Spanish and

English cognates, knowledge of word structure in one language could facilitate literacy in L2 (Kuo & Anderson, 2012). To date, there are numerous evidenced based interventions to meet the literacy needs of ELLs specifically (Gersten, Dimino, Jayanthi, 2007; Lesaux, Kieffer, Faller, & Kelley, 2010).

Research from Diverse Linguistic Backgrounds

Several studies involving ELLs from various linguistic backgrounds demonstrate the predictive role of morphological awareness in learning to decode, comprehend, spell and acquire vocabulary. To date, there are not any studies conducted involving the role of MA among Nyanja-English bilingual students. Therefore, reviewing similar studies involving ELLs and other languages, both alphabetic and non-alphabetic, give a better representation of the role of MA. The critical role that MA has in learning to read in native language (L1) and target language (L2) has been well documented such as Chinese to English (Pasquarella, Chen, Lam, Luo, & Ramirez, 2011), and English to French (Deacon, Wade-Woolley, & Kirby, 2007), English to Hebrew and Arabic (Bindman, 2004; Saiegh-Haddad & Geva, 2008). MA was found to play a critical role between alphabetic (English) and non-alphabetic languages (Arabic and Hebrew; Saiegh-Haddad & Geva, 2008; Schiff & Califf, 2007). These findings suggest the need for ELLs to increase their MA to augment their literacy proficiency in the target language. With this backdrop and understanding, take into account Zambian school children, nearly all of whom are considered ELLs, living with far fewer reading resources, less teacher preparation, fewer systematic interventions, and low SES or abject poverty. Literacy acquisition becomes a much more complex issue.

Purpose and Research Question

Given the critical role that MA plays in literacy development of students learning to read in alphabetic and non-alphabetic languages, and the paucity of research involving children of Bantu languages learning in academic English, further investigation is warranted. This study seeks to understand the relationship that English MA has with reading ability among ELLs whose academic language abilities may not fully support their literacy learning. A dearth of studies exists among this population and similar populations in the Sub Sahara region. The primary research question is: To what extent does English MA predict reading comprehension among 6th grade Zambian students in a multi-linguistic context?

Method

Settings and Participants

This study took place in two schools located in Lusaka, Zambia, a former British colony whose medium of school instruction is English. Both schools were categorized as basic, government-run schools that included students in grade one through seven. The ages of students in Zambia's basic schools typically range from seven to fourteen. It should be noted that children enter school for the first time at different ages, for example, it is common for a 9 year old to enter 1st grade. A member of the Zambian Ministry of Education helped recruit the schools for this study. Both head masters of the schools welcomed the research team's efforts. Four teachers (the 6th grade team) from School A offered to participate and help with organization and movement of students

when testing began. One teacher from School B offered her classroom and agreed to the team's research initiative to collect data.

Students. Two hundred six 6th grade students participated in the study. The vast majority spoke an indigenous language at home and other non-school social contexts they encountered. The students were all considered English language learners (ELLs) given that their native language and primary home language was not English, but the language of instruction was English. One hundred eighty one participants (94 of whom were female) attended school A and 25 participants (14 of whom were female) were from school B. Both schools were located within Lusaka city limits. School A supported and welcomed the researchers conducting a study among their students and making connections with the teachers both professionally and personally. The head master from school B was less supportive. Consequently, only one teacher from School B showed interest in the study and agreed to the data collection.

When asked what language they predominantly used at home/outside of school, 63% of the participating students reported Nyanja demonstrated in Table 1. Other languages included Bemba (26.7%) and Tonga (9.7%). Most all of the participants spoke more than two languages, but for purposes of this study, we queried the language used most frequently in non-school settings. We also noted that nearly all participants were able to speak Nyanja in social contexts with Nyanja speakers.

Demographic data (see Table 1) provided by their schools revealed roughly one-third of the students (i.e., 29%) lived in poverty which translates to $3 USD or less per day (The World Bank Group, 2011). The majority of the participants (i.e., 61%) lived

somewhat above the poverty line averaging $300 to $800 per month (See Table 1) and approximately 10% of the participants came from homes where the average combined salary was over $800 per month. Over half of all Zambians live in poverty and about 14% of people between the ages of 15 - 49 struggles with AIDS/HIV (Central Statistical Office, 2012). Consequently, systematic absenteeism and high dropout rates are widespread (Central Statistical Office, 2007) and attributable to children helping generate family incomes or take care of ill family members (Siaciwena and Lubinda, 2008). Since 2002, free basic education for grade one to grade seven is guaranteed, but the reality is that about 80% of children can access basic education and about 47% will drop out (UNICEF).

Teachers. To have a deeper understanding of the school environment and teacher preparation, the researchers interviewed the teachers of the students in the study. The teachers, however, were not part of the study. These teachers taught an average of seven years in basic schools in Lusaka. Four of the five teachers worked together as the 6^{th} grade team at School A and one worked at School B. Four of the five teachers completed teacher training college; one teacher was enrolled in a university program to further her education, and one teacher was in his second year in the teacher training completing a practicum. All teachers had graduated high school and spoke English; however as is the case in countries like South Africa (Sailors, Hoffman, Pearson, Beretvas, & Mathee, 2010), English is not their dominant language. Side conversations among the teachers and students on many occasions were in Nyanja. All of the teachers spoke Nyanja as well as other dialects outside of their academic settings. Lastly, the

teachers reported that their jobs were very challenging for a number of reasons including students per class, lack of materials, lack of administrative support, lack of professional development, students' low achievement, and disproportion of academic skills among students.

Assessment Procedures

The principal investigator and three trained research assistants conducted all assessments for this study. One research assistant was an undergraduate student from the same university in the United States who was trained by the principal investigator prior to traveling to Zambia. Her training spanned approximately eight hours and consisted of reviewing the testing materials by reading and discussing each assessment's purpose, observing the principal investigator modeling the protocol of administration and practicing administering each of the tests.

Upon arrival to Zambia, two additional Zambian research assistants were also trained by the principal investigator to help with tests requiring one-on-one administration. One of the Zambian assistants was an education major at the University of Zambia; the second was a former school teacher. The principal investigator and the first research assistant helped train the Zambian research assistants. These assistants were employed to administer only the tests that required individual administration (e.g., WIAT II word reading). The total amount of training time for the two Zambian assistants was approximately four hours.

A range of standardized tests typically used in the United States were administered to measure participating students' reading abilities related to comprehension, vocabulary knowledge, orthographic knowledge, word decoding skills, and MA. All assessments in this study were administered in English and took place during the morning sessions for School A and during afternoon sessions for School B. Throughout the study, two observers assessed fidelity of testers' implementation via direct observation during 20% of each research assistant's testing administrations; IOA was 100% for each of them.

Tests assessing morphological derivational and decomposition knowledge, reading comprehension, and vocabulary were administered in whole group settings. Tests of word reading ability and orthographic knowledge were administered individually. Only morphemic measures were presented in both oral and written form to avoid any word decoding conflicts; all other measures were administered in written form only. Directions were read aloud and participants were monitored in quiet settings. Testing sessions involved one or more of the five assessments (i.e., MA, comprehension, orthography, vocabulary, word reading) and ranged from 20-50 minutes to complete. Students were provided pencils and seated logistically to prevent cheating and talking. They were encouraged to perform to the best of their abilities, but no assistance was provided other than with directions.

Instruments

In order to better understand the role of MA in reading ability, word decoding, comprehension, orthographic knowledge, vocabulary, and derivations and

decompositions of morphologically complex words were measured. Derivational and knowledge measurement was adapted from Carlisle, 2000; Vocabulary and Reading Comprehension was measured using the Grade 3 Blue form (Gates & MacGinitie, 1989). Word reading was measured using the Weschler Individual Achievement Test, second edition (Weschler, 2005). Orthographic knowledge was measured using Process Assessment of the Learner Reading and Writing Second Edition (PAL-RW II; Berninger, 2007).

Decomposition and Derivational Knowledge. An adaptation of Carlisle´s (2000) morphological structure tests were used. The test was provided in oral and written form to avoid decoding problems. The test included a range of derivational suffixes including high and low frequency (i.e., *-er, -ness, -al, -ly, -th*). The items include the following shifts between the derived and base form: 1) no orthographical or phonological shifts (i.e., *happily-happy*), 2) orthographic shift only (i.e., *reliable-rely*), 3) phonological shift only (i.e., *muscle-muscular*), and 4) both phonological and orthographic shifts (i.e., *depth-deep*). In the 28 item decomposition test, the derived word is given and the participant must decompose it to extract the target word (i.e., *(reliable) On his friend he could always <u>rely</u>*). In the 28 item derivational knowledge test, the participant was given the target word and expected to create a derived word (i.e., *(reason) Her argument was quite <u>reasonable</u>*). The target word along with the sentence was read aloud. Again, correct spellings of the stem and suffix should not include more than one phoneme deviation since the stem is provided such as in *equluti* for *equality* that has two phonemic deviations.

Vocabulary and Reading Comprehension. Both vocabulary and reading comprehension were measured using the Gates MacGinitie (1989), third edition, Grade 2 Blue form. This subtest has a Kuder-Richardson Formula 20 reliability coefficient of .93. The Vocabulary test measures vocabulary ability needed for reading texts. Part of speech clues are given to help the reader determine how the word is used but no clues are given to help determine meaning.

The Comprehension test measures students' comprehension of text types that come from published books and/or articles are similar to what students encounter in an academic setting. Students need to be able to extract literal understanding of the text as well as infer or draw conclusions.

Word Reading. Word reading was measured with Wechsler Individual Achievement Test 2nd Edition (WIAT II; 2005). This subtest measures how quickly and accurately a student can recognize individual words. Students are expected to read words presented to them that gradually increase in difficulty.

Orthographic Knowledge. Orthographic knowledge was measured with Process Assessment of the Learner – Reading and Writing (PALS II, 2007). PALS-II is a norm referenced test that is administered to K-6th grades and is administered individually. The student reads a target word for 1 second. Following that, the student is exposed to the comparison word, letter or letter group for 5 seconds or until the student is able to determine if they matched or not. Test-retest reliability comparisons involved 86 students from grades 1, 3, and 5.

Results

Descriptive statistics were calculated to examine measures of central tendency and variability for the continuous measures focused in this study (See Table 2) and frequencies for categorical measures (See Table 1). Table 2 summarizes the descriptive statistics conducted on the raw scores for the continuous measures of interest.

A 3-step hierarchical multiple regression was conducted to determine the predictive value of morphemic awareness in the dependent variable, reading comprehension, above and beyond that accounted for by the potential classroom effect, demographic variables, vocabulary, orthography and word reading. Scatter and residual plots revealed that the assumptions of normality, linearity and homoscedasticity were satisfied (Pallant, 2001). Tests for multicollinearity indicated a range of acceptable VIF levels (VIF = less than 1.37 for demographic variables, 5.95 for vocabulary, 4.34 for word reading, 6.45 for orthography and 8.72 for morphemic awareness). An examination of Cook's distance (Cook, 1977) which finds outliers, whose standardized residual is greater than 3.3 consistent with the .001 alpha level, with regard to both the dependent and independent variables indicated no multivariate outliers. In addition, centered leverage values were examined to assess the distance of a value of the independent variable value is from the mean value, and all values were less than .1. Correlations between the independent variables are presented in Table 3. Notably, literacy related variables were highly correlated such as reading and vocabulary (r= .874) because they work in tandem to promote reading comprehension. Both maternal education and SES were moderately correlated with reading (r= .451 and r= .361, respectively).

The model as a whole with all predictor variables is a statistically significant predictor of the outcome, reading comprehension (See Table 4). For step 1 in the hierarchical multiple regression, demographic variables were added (age, maternal education, SES, home Language, classroom assignment, and gender). Demonstrated in Table 5, demographic predictors contributed significantly in explaining 24.2% of the variability in the dependent variable, reading comprehension, R^2= 24.2%, $F(5,3)$ = 12.74, p <.001 as compared to a model with no predictors. In the first step (See Table 6), maternal education (β =.371, t = 5.142, p <.001) and SES (β =.182, t = 2.522, p <.05) significantly contributed to reading comprehension.

In Step 2, word reading, orthographic knowledge, and vocabulary explain an additional 59.8% of variance in reading comprehension while statistically controlling for demographic variables and classrooms (ΔR^2 = 59.8%, $\Delta F(5,3)$ = 244.419, p < .001). Shown in Table 6, orthography has the largest beta weight in this step of the model (β = .362, t = 5.548, p <.001), secondly vocabulary (β = .349, t = 5.562, p <.001), and word reading (β = .238, t = 4.304, p <.001) all contributing significantly to reading comprehension.

In the last step, morphemic awareness was examined, and the analysis confirmed its predictive ability over and beyond other predictor variables, (ΔR^2 = 2.2%, ΔF (3,1) = 31.147, p < .001). The final model recorded morphemic awareness with the highest beta weight (β = .438, t = 5.581, p <.001) and secondly vocabulary (β = .191, t = 2.941, p <.001). Word reading (β = .156, t = 2.835, p <.05) and orthographic knowledge (β = .196, t = 2.908, p <.01) marginally contributed to this model.

Discussion

The question guiding these analyses was to examine the extent morphemic awareness (structural knowledge and meaning) contributes to reading ability among 6th grade Zambian ELLs. Previous research conducted in developed nations guided us to believe that morphemic awareness would contribute significantly to reading skill after controlling other known literacy predictors (e.g., Carlisle, 2000; Carlisle & Nomanbhoy, 1993; Kirby, Deacon, Bowers, Izenberg, Wade-Woolley, & Parrilla, 2012; Nagy, Berninger, & Abbott, 2006). The results of the present study add to the literature by providing evidence that for 6th grade Zambian ELLs there is a significant association between awareness of English word structure and comprehension even in the absence of explicit and systematic morphological instruction. The findings from this study also contribute to the research community's understanding of morphemic awareness' contribution to English literacy development among native speakers of Bantu languages without the support of native language literacy transfer (L1).

Because standardized tests used in this study are norm referenced for fluent English speaking students whose backgrounds reflect typical American students, raw scores were used in all analyses. The students in this study differed vastly with American students on various levels, such as SES, learning experiences, classroom size, home language, maternal education, and average hours spent engaged in learning at school). The researchers piloted 5th, 4th and 3rd grade levels on comprehension and vocabulary measures with 25 students randomly chosen from different classrooms and got floor effects on all levels. Grade 2 levels were then used to test all students. On another note,

learning to read well hinges on reading opportunities. However, access to books for these students represented in this study was exceptionally limited in most homes and in classrooms. Moreover, it was common practice to share class sets of text books between classrooms, and even then, some students needed to share text books. Reading books, such as classroom libraries, existed in one out of the fives classrooms, with very few books that the teacher donated.

The analyses determined that demographic variables, especially SES and maternal education, explained 25%, and orthographic knowledge, vocabulary, and word reading contributed nearly 60% to reading ability. Morphemic awareness added 2.2% over and beyond that of the other predictor variables. Although it's small but significant contribution, morphemic awareness appeared to be developing in tandem with other literacy predictors since they were all highly correlated. Overall, average scores on derivations and decompositions of complex words, vocabulary, word reading and orthographic measures were below 70% (r=.61) signaling emergent literacy levels in most cases. Also noteworthy is that in the midst of emerging literacy skills developing, derivational knowledge is emerging synchronously. Typically, derivational knowledge develops after inflectional knowledge and in conjunction with more developed reading ability. It is possible that older students, such as these students, have been exposed to a variety of complex words that may help build derivational knowledge faster than a younger child acquiring literacy.

In spite of their low scores, morphemic knowledge facilitated their reading comprehension attempts above that left to chance, and arguably should be a key

component in Zambian literacy curriculum to bootstrap all literacy endeavors. As the correlations among literacy predictors demonstrate, morphemic awareness' effect would have been considerably larger (ΔR^2 = 83%, ΔF (1,5) =982.062, $p < .001$) if it had been entered first in the hierarchical models. According to Anglin (1993), younger students focus more on root word knowledge to understand unknown words in written texts. More developed morphemic awareness typically guides and helps readers process morphemes' semantic and syntactic information allowing words to be recognized more quickly (Carlisle & Stone, 2005; Elbro & Arnbak, 1996). These findings are promising as they signal practitioners and researchers to a critical component for improving reading and vocabulary ability in this population.

Orthographic knowledge gained only marginal significance when morphemic awareness was entered. Both skill sets require visual discrimination and understanding of legal letter combinations within words (e.g.,*-ous, -tion*), while morphemic knowledge additionally requires semantic and syntactic knowledge. Interestingly, students' common errors demonstrated strong evidence of phonetical understanding and only emerging evidence of morphemic and orthographic understanding (e.g., *joyus- joyous; revishun-revision; resonable-reasonable; majorate-majority; expretion-expression; teachair-teacher; pertechan-protection*). In this exercise, students were expected to add the suffix exposing their ability to go from part to whole to form a complex work. To leverage word problem solving and increase vocabulary, instruction needs to emphasize building knowledge of roots of words and affixes and how these two separate and combine to form new words (Pacheco & Goodwin, 2013).

In line with the aforementioned skills, Chomsky (1970) coined "lexical spelling" referring to the way the English language carefully upholds spellings (e.g., *sign* not *sayn-* to *signature*) which aids visual discrimination and memory when acquiring new vocabulary and learning to spell words (i.e., being aware of the orthography) with the same base (e.g., *swim-swimmer; major-majority*). Our results from the decomposition and derivation tests suggested that both orthographic and morphemic knowledge skills were weak therefore impacting word recognition and word production ability. Students fared somewhat better when decomposing complex words with transparent relationships (e.g., *warmth-warm; agreeable-agree*). Decomposing less transparent words resulted otherwise (e.g., courageous. *The man showed great coureg;* decision. *The boy found it hard to decid;* variable. *The time of his arrival did not varia;* description. *The picture is hard to descrip*). Likewise, creating derived words when given base words challenged most students (e.g., long. *They measured the ladder's longer;* humor. *The story was quite humorly*.). The tests' formats may also be a factor in the low performance among students noting that they may not have had many experiences with these kinds of tests. Given the gaps in their morphemic and orthographic understandings, the majority of students depended heavily on phonological interpretations for spelling and at times did not know the correct suffix to add. These results also suggested children's deficits with English vocabulary, certainly complex words that are more pervasive beginning in upper elementary years.

Limitations and Future Direction for Research

The present study contains some limitations that need to be considered with future research and generalizing results among this population. Most notably, this study was limited by having only one classroom represented in school B. Additionally, the study did not take into consideration how school characteristics might affect reading comprehension and growth. In the future, with an adequate sample size, it would be worthwhile to examine classroom- and school-level effects. Furthermore, this study investigated students' reading comprehension and development in English and did not evaluate growth in native Bantu languages, such as Nyanja, which limits our understanding with respect to the full extent of reading skills. Along the same lines, controlling for verbal and non-verbal intelligence could have helped exclude a students' ability to reason as a spurious variable. Additionally, prior studies included word and pseudo-word reading measures to better understand the role of morphemic awareness in identifying and processing recognizable morphemes even among non-words. Since the participants were ELLs, however, it could be argued that a non-word measure may have been too difficult since their overall knowledge of word structure was low. The findings from this study strongly suggest that morphemic awareness be evaluated early on and that it be a critical component in literacy instruction (Bowers, Kirby, & Deacon, 2010; Nunes & Bryant, 2006).

CHAPTER III

EXTENT OF MORPHEMIC AWARENESS IN WRITING

Overview of Literacy Development in Zambia

For most children in Zambia, the use of language is not always a clear pathway to learning. Children, for the most part, learn about their world through an intrinsic and sociocultural base that encompasses fundamental knowledge structures including language (Gopnik & Choi, 1990). Children use language to learn and make sense of their world, and naturally, their linguistic abilities grow, too. Both oral and written language is the medium that children use to represent their world and learn (Vygotsky, 1978).

Zambian school children cannot always navigate well in their second language, English, which impacts literacy acquisition and learning outcomes (Cummins, 1989; Manyike, 2013). Nearly all children speak at least one other Zambian language in their home (i.e, Nyanja, Bemba, Tonga), while English is the second language (Tamnulukani & Bus, 2011). After Zambia gained independence from Great Britain in 1964, United Nations Educational, Scientific, and Cultural Organization (UNESCO) implemented English as the language of instruction (UNESCO, 1964). The consequences of this policy did not promote literacy. Instead, in 2010, 46 years after British colonization ended, The *Southern and Eastern Africa Consortium for Monitoring Educational Quality* (SECMEQ; 2010) found that 44% of Zambian 6th graders were functionally illiterate or performing at emergent reading levels while only 29% demonstrated basic

reading skills that are learned in kindergarten or 1st grade. Furthermore, results from the study revealed that only 15% achieved a *reading for meaning* level and a meager 12% attained a more advanced level (e.g., inferential, analytical, or critical reading levels). Makuwa (2010) stated that Zambia was "substantially below the SACMEQ average for both reading and mathematics in both 2000 and 2007" (p. 1). Although English literacy achievement is below average, Kaanu (2013) reported that students in Zambia have struggled with literacy achievement for decades in their native languages and the language of the government, English. The stakes are high and challenges are mounting for Zambian school children to read and write competently in native languages and English.

Efforts have been made to change the trajectory of under achievement among Zambian school children. Zambia's Ministry of Education in 1996 created a curriculum designed to facilitate students in elementary and middle school grades to read and write proficiently in a Bantu language and English (Ministry of Education, 1996, 34). As a result of this policy, beginning in 2002, native language literacy was taught in 1st grade which is also the first year of formal education for many Zambian children. The model, when implemented with fidelity, provided limited local language literacy support until 5th grade, but the emphasis was targeted at developing English literacy proficiency. In fact, Kaani (2009) demonstrated that students tended to perform better in English than Nyanja, a Bantu language widely used primarily in the capital, Lusaka.

For nearly all Zambian school children who are considered English language learners (ELLs), one of the key challenges in literacy development centers on acquiring

language skill sets that Cummins (1992) defines as *Cognitive Academic language Proficiency* (academic language) that takes five to seven years to develop for ELLs. This language skill set refers to listening and reading, known as receptive skills, and speaking and writing, known as productive skills, needed for academic success in the language of instruction. Academic language also involves engaging in more complex thinking skills including making judgements and inferring information from a text. Henning and Dampier (2012) also argue that lack of academic language delays learning, and they maintain that students need to develop sophisticated language skills to comprehend texts, to pose questions, to understand discussions, to defend their answers and to explore beyond the given instruction or assigned texts. Fang and Schleppegrell (2008) also report that proficiency in reading comprehension and writing ability requires well developed academic language. The cognitive demands increase with academic language as new ideas, concepts and language are presented simultaneously.

Outside of the academic realm, academic English is used less frequently or not at all in social settings where the majority of Zambians' speaking and listening interactions tend to occur. Social communication is not as demanding cognitively as academic language and is less specialized. Social interactions help speakers understand quickly because they are context embedded, or they occur in a meaningful social context (Cummins, 2007). Zambian students as well as teachers tend to speak the local language, Nyanja for instance, on the playground, in sidebar conversations in class or on phones, and for explanations to support conceptual understanding. The time dedicated to developing academic language is limited among Zambian school children, although

academic language is what needs to be developed greatest in both local language and English to achieve literacy proficiencies in both languages.

Bilingualism, Teacher Training, and Policy

Other research points to how the brain is wired for language. Bialystok (2008) posited that multilingual or bilingual individuals undergo a series of ignitions in their brains which create receptive and productive connections to generate language. Although these receptive and productive skills are learned in one language first, they are not relearned for the second or third language. The bilingual individual uses these skills distinctly in each language. For most Zambian school children, however, the balanced bilingual brain is not well developed because as mentioned earlier, social and academic language are developed in different settings and with less time devoted to developing academic language. To add to the problem, many teachers receive on average one year of teacher training with a one year practicum that many times converts into full time teaching (Thomas, Thomas & Lefebvre, 2014). Many times, especially in rural areas, teachers have to learn the native language spoken by their students (Croft, 2006). According to Thomas and Thomas (2012), most teachers surveyed in their study described how they struggle greatly with differentiating curriculum to reach low achieving students and language barriers create even larger obstacles. In another study, Clegg & Afitska (2011) report that numerous teachers are less than proficient in English, the language many times they are expected to teach in and model to children. With this backdrop, the challenge to teach children sometimes requires sacrificing native language

literacy development and in other cases not providing adequate language modeling (Kashoki, 1990).

In 2014, the Zambian educational policy was revamped to include an exclusive use of native language instruction and literacy development in 1st through 4th grades before children transition into English instruction (Curriculum Development Centre, 2013). Research has shown that well developed-native language (L1) proficiency facilitates second language (L2) development (Collier & Thomas, 1995; Krashen & Biber, 1987). According to Kuo and Anderson (2012), balanced bilinguals (i.e., equal proficiencies in both languages) tend to be more sensitive to language structures in general which helps them acquire literacy in their L2. Thus, the 2014 Zambian bilingual model for public schools fosters an additive bilingualism approach (Lambert, 1975) that values both languages and cultures associated with them and potentially positively impact a child's development. Pre- and post-British colonization promoted a subtractive bilingualism in which children were educated in English, the prestigious language, without appropriate support in native languages, such as Nyanja or Bemba.

For multiple socio-cultural, health and socio-economic reasons that go beyond the scope of this paper, Zambian school children continue to struggle greatly with literacy acquisition in native languages, such as Nyanja, and in English. Consequently, this spirals into a trajectory of unremitting under-achievement in reading and writing which affects content area learning as well as learning opportunities. Zambia's educational backdrop sets the scene to better understand the current status of educational experiences of most Zambian students. Unlike results that are typical from research

conducted in advanced nations, such as the United States, results from Zambian, or Sub-Saharan student samples, will likely be different. To better understand students' writing abilities combined with the complexity of language of instruction and local language, Nyanja, the current study focuses on linguistic complexity in sentence writing ability by examining meta-linguistic associations among morphological awareness, spelling, and orthographic knowledge. The following sections review morphological awareness, spelling, orthographic skill and writing.

Morphological Awareness

To begin, morphemes are the smallest units tucked within words that change a word's syntax and semantical meaning as well as can be organized in different ways to create new words (i.e., *endure* contains one morpheme; *endurance* contains two morphemes, base / *endur* and suffix *ance*). Morphological awareness refers to a child's ability to recognize and know how to manipulate these units of meaning in words in multiple ways (Carlisle, 1995). Research shows that children in later elementary grades are more linguistically equipped to understand that morphologically complex words undergo grammatical or syntactic, phonological, and orthographic shifts to form new words (i.e., *day-daily, courage-courageous, five-fifth*; Anglin, 1993; Carlisle & Fleming, 2003; Mahony, 1994). Morphological awareness, furthermore, develops when children are continuously exposed to oral and written English (Perfetti & Hart, 2001; Reichle & Perfetti, 2003). Numerous studies have established that there is a high correlation between morphological awareness and word reading (Carlisle & Stone, 2005; McCutchen, Green, & Abbott, 2008) and comprehension (Carlisle, 2000; Kieffer &

Lesaux, 2012). Moreover, Carlisle (2010) in her synthesis of the literature, reported that morphemic related instruction can facilitate word reading (Lyster, 2002), comprehension (Elbro & Arnbak, 1996), and vocabulary (Baumann, Edwards, Boland, Olejnik, & Kame'enui, 2003). That is, instruction focusing on developing morphological awareness could help boost morphological skills which, in turn, can contribute favorably to underdeveloped phonological processing skills characterized among struggling readers (Carlisle, 2010; Elbro & Arnbak, 1996). Basic linguistic knowledge fosters and underpins reading and writing skills which are the pillars to achieving academically.

Morpheme Types and Accessibility

Morphemes are classified according to their linguistic functions. Inflectional morphemes include number, tense, gender, and plural markers. Berko's (1958) famous *wug* study revealed that preschool children already have a working knowledge and ability to apply inflectional markers. Derivational morphemes, however, exclusively mark or signal grammar changes in words (Adams, 1990). Children's control of derivational morphemes typically develops in upper elementary school (Nagy, Berninger, & Abbott, 2006).

The dual route model suggests that morphologically complex words can be recognized by (1) parsing out the spoken or written constituent morphemes (i.e., *magic al*) or (2) directly accessing the morphologically complex word as a whole unit stored in memory (Pinker, 1998). The model furthermore posits that words spelled according to the conventions of English orthography are retrieved quicker than irregularly spelled

words (i.e., *bomber* or *ache*, both have a silent letter; Carlisle & Katz, 2006; Prasada & Pinker, 1993).

Morphological Awareness and Writing

It is likely that reading and writing share a two way relationship implicating that proficient writing engages a constellation of interrelationships that share many cognitive processes and linguistic ability (Eisterhold, 1991), including morphological awareness, to be able to produce quality text. Writing also includes a component known as language complexity signifying a child's range of words in addition to a child's average length of the utterances (Purcell-Gates,1988). Previous studies such as Carlisle (1996) and Green, McCutchen, Schwiebert, Quinlan, Eva-Wood, and Juelis (2003) explored children´s use of morphological ability in spontaneous writing. Their primary findings revealed that elementary-aged children did not use a variety of morphologically complex words but tend to use inflected forms more. These studies further demonstrate that children tend to use high frequency suffixes, such as the agentive *–er* and adjectival *–ly* (Arnoff, 1976) and less use of low frequency suffixes. Researchers have established that understanding the morphological structure of English words predicts students' written abilities (e.g., Apel & Diehm, 2014; Carlisle, 2000; Goodwin & Ahn, 2013). The use of morphologically complex words (i.e., derived words) in children's writing (in English) typically increases beginning with 4th and 5th grades and beyond (Apel & Werfel, 2014; Carlisle, 1996; Green et al., 2003). Morphologically complex words undergo syntactic, phonetic, and orthographic shifts as evidenced in *rely* and *reliable* or *mystery* and *mysterious* (Kuo & Anderson, 2006). Carlisle (1996) found that by 3rd grade, both

proficient and struggling readers were using and spelling inflected words with greater frequency as opposed to morphologically complex words. Green et al. (2003) also reported similar results among 3rd and 4th graders. Both studies demonstrated that 2nd through 4th grade children are generally not using many morphologically complex words in their writing and typically misspell these words, too which aligns with typical development because morphological awareness begins to increase in upper elementary.

Mounting evidence also reveals that developed morphological awareness is tapped to help infer meanings of unknown words; this, in turn, helps bootstrap vocabulary skills whilst engaged in reading (McCutchen & Logan, 2011). Retrieving words from long term memory and choosing the most appropriate words becomes quicker and easier than? (McCutchen, Covill, Hoyne, & Mildes, 1994). Understanding the function and utility of morphological transformations that is evidenced in *sign* to *signature* or *bomb* to *bombardment* facilitates writers to generate more complex syntax (Lawrence, White, & Snow, 2010). This is noteworthy to mention because between 60 to 80 percent of the vocabulary in upper elementary and middle school years comes from morphologically complex words (Nagy & Anderson, 1984).

Seminal work done by Hayes and Flowers (1980) defines three processes that occur when engaged in writing: planning, translating and reviewing. The planning stage takes into account the generation and organization of ideas. Secondly, translating takes these ideas and transfers them into legible and comprehensible text. Lastly, reviewing implicates the ability to modify and edit the text to meet the conventions of writing. This model, however, is based primarily on adult learners; consequently, it does not capture

the scope of challenges that younger writers often face. Skill sets vary greatly between adults and young or unskilled writers. For instance, producing grammatically correct sentences and accurate spelling challenge most young or unskilled writers. Notwithstanding, these are skills that young writers are developing in combination with amplifying their vocabulary to be able to write more proficiently.

To better examine how children approach writing tasks as opposed to adults, Berninger, Cartwright, Yates and Swanson (1994) extended the Hayes and Flower (1980) model to accommodate the writing demands and challenges faced primarily by children. They included two additional components under the translation stage: transcription and text-generation. Transcription entails skills such as spelling and handwriting. Text-generation, on the other hand, is more involved with word retrieval and syntax or sentence construction. Morphological awareness plays an integral part in both transcription (e.g., Bryant, Deacon, & Nunes, 2006; Deacon, Kirby, & Casselman Bell, 2009; Kemp, 2006; Leong, 2000) and text-generation (e.g., Carlisle & Stone, 2005; Green et al., 2003; Casalis & Louis Alexandre, 2000; Deacon & Kirby, 2004).

Morphological Awareness, Spelling, and Orthography

Part of transcription involves proficient spelling in part to reduce the work load for the working memory when engaged in writing (Berninger, Raskind, Richards, Abbott, & Stock, 2008). Opaque languages, such as English, require strong orthographic knowledge to identify variations of graphemes mapping onto individual phonemes (Ehri, 1998). Spelling ability, therefore, depends greatly on orthographic knowledge to help parse morphological and phonological properties in words (Ehri, 1992). Along the same

lines, Perfetti (2007) asserted in his Lexical Quality Hypothesis that strong readers and spellers alike tap into a word´s underpinning processes (orthography, phonology and semantics). These processes help promote understanding of the sub lexical properties of a word, such as morphemes. This hypothesis is supported by findings from Deacon, Kirby, and Casselman Bell (2009) who found that morphological awareness was robust in the contribution of general spelling outcomes in 2nd through 4th grades. Consistent with this theory, morphological awareness can help clarify anomalies found in words such as *fox* and *knocks* that share the same final sounds but are spelled differently with distinctive morphemic markers (Nunes & Bryant, 2006). Furthermore, Treiman´s (1993) research confirmed that spelling ability was related closely to morphological and orthographic knowledge. The development of such skills follows a similar trajectory among students with writing difficulties (Bourassa & Treiman, 2008). Lastly, mounting evidence reveals that instruction that focuses on morphological understanding is effective in boosting spelling ability among typical and atypical learners (Berninger et al., 2008; Nunes & Bryant, 2006). Morphological awareness is crucial to spelling development as it requires a student to tap into a deeper analysis that goes beyond phonological cues.

Empirical support for a link between order of acquisition for inflectional suffixes in oral language and in written language comes from research demonstrating a link between being aware of morphemes and the being able to manipulate them (morphological awareness), as well as the spelling of those same morphemes (i.e., Carlisle, 1996; Rubin, 1988; Shankweiler, 1989, Shankweiler, Lundquist, Katz,

Stuebing, Fletcher, Brady, et al., 1999). Perhaps the best controlled evidence comes from a longitudinal study of past-tense spelling of morphemes. Nunes, Bryant & Bindman (1997a; 1997b) found that primary aged children's awareness of past tense inflections in oral language (assessed with an analogy task targeting the past tense) contributed uniquely in children's ability to represent past tense suffixes twenty months after awareness was tested. The connection between morphological awareness and spelling was robust after controlling for the effects of age, intelligence and general spelling ability, and emerged for spelling of both real (1997a) and pseudo-words (1997b). Given the specificity of the relationship between performance on oral and written tasks in studies examining single morphemes, it can be hypothesized that children acquire and use derived forms in both oral and written form the same way.

Morphological Awareness, Syntax and Proficient Text Generation

Fluent or proficient writers free up extra space in their working memories (Hansen & Bowey, 1994) to be able to attend to the many demands of writing (Saddler & Graham, 2005). Part of this fluency includes well-developed morphological awareness. Phrases such as *the people in my class* or *people who work on farms* can be transformed into *my classmates* or *farmers.* This ability to manipulate words morphologically is a gateway for writers to economize their words more succinctly (Berninger, Nagy, & Beers, 2011; McCutchen, Stull, Logan Herrera, Lotas, Evans, 2014). Berninger et al., (2011) also found that children´s level of morphological awareness predicted their ability to fuse ideas together from multiple sentences into a single sentence. Green et al. (2003) asserted that contributions from morphological

awareness beyond spelling and word reading may be helpful with developing writing skill because derived words mark or signal parts of speech (Green et al., 2003).

Compared to their peers, struggling writers have problems with both language skills and working memory (Baker, Gersten, & Graham, 2003; Berninger, 2008; Saddler & Graham, 2005). Generating grammatically correct sentences requires accurately arranging words together. According to Cain and Oakhill (2007), students who struggle with reading and writing tend to have sufficient short term memory for retrieving words but slower working memory that enables them to manipulate a string of words to produce a grammatical sentence. For the most part, students who struggle with writing typically receive writing instruction that focuses on planning and revising but less on strategies to boost overall quality such as increasing linguistic complexity (Bui, Schumaker, & Deshler, 2006; De La Paz & Graham, 2002; Graham, MacArthur, & Schwartz, 1995; Graham, Harris, MacArthur, & Schwartz, 1991).

Purpose and Research Question

In this study, we extend our understanding of children's knowledge of morphemic awareness in a sentence writing activity by considering a sample of bilingual (and multilingual) 6th grade students in Lusaka, Zambia who are learning in English, their second language. The primary research question is: To what extent does English MA predict correct use of morphologically complex words in a sentence writing activity among 6th grade Zambian students in a multi-linguistic context?

Method

Setting and Participants

Students in this study came from two public schools in Lusaka, Zambia (i.e., basic schools, grades 1-7). English was the language of instruction, although students spoke native languages (mainly Nyanja) in all other social contexts. Notably, children in Zambia do not always enter first grade at age 6 or 7; in fact, it is commonplace for a 10 year old or older to enter first grade, for instance. Thus, the range of ages for these students ranged from 10 to 14 (See Table 1). A member of the Ministry of Education helped substantially in recruiting two schools who agreed to participate in the study. School A's 6th grade teacher team agreed to participate along with strong support from the head master. School A comprised four classes with a total of 181 6th grade students. One 6th grade teacher from School B agreed to participate with 25 students. She excluded students who could not read or write before testing began. Teachers from both schools were receptive to the research and helped facilitate data collection.

Students. The study included 206 participants (94 female, 87 male) attended school A and 25 participants (14 female, 11 male) attended school B. Both schools were located within Lusaka city limits. All participants were considered English language learners (ELLs) since the language of instruction was English, but for all other social contexts, students spoke their native languages. The students represented a range of literacy levels. Some students entered school later than others, and some students had to take a year or two off. Students must pay fees to attend public schools in Zambia. Although the cost is minimal, for many families it is not affordable.

Of the participating students, 63.6% reported Nyanja as their primary language outside of academic contexts; 26.7% reported Bemba, and 9.7% reported Tonga (see Table 1). Since Zambian children are exposed to multiple Bantu languages and typically speak more than one, we wanted to focus on the language that was most often spoken outside of school settings. The students in this study spoke Nyanja even when they reported Tonga or Bemba as their primary language. Nyanja is a primary language in the Lusaka area.

Poverty, defined by the World Bank Group (2011), is living on USD $3 or less per day. According to this definition, 28.6% of the students lived in poverty. There are approximately 60.5% of Zambians who live within these marginal means. AIDS is another ongoing struggle among Zambians; it is estimated that about 14% of people between the ages of 15 - 49 struggles with AIDS/HIV (Central Statistical Office, 2012). This translates into frequent long term absenteeism and high incidences of dropping out of school. Children many times are needed to help supplement incomes or take care of sickly family members (Siaciwena and Lubinda, 2008). For students represented in this study, however, 60.7% of them came from homes where the SES was between 300 to 800 USD per month and approximately 70% of mothers reported having completed primary or middle school grades (See Table 1).

Teachers. Although teachers were not included in the study, the researchers interviewed five teachers to gain a better understanding of their academic preparation. Four teachers came from School A and one teacher from School B. They taught an average of seven years in public schools in Lusaka. One teacher had previously taught in

a village school until getting transferred to Lusaka. Four of the five teachers completed teacher training college (i.e., one year preparation followed by one year practicum in a school). Typically teachers complete a one year practicum under the supervision of a master teacher. However, the teacher completing his practicum was teaching the class alone with the assistance of the other three 6th grade teachers. Of the four who finished teacher training college, one was actively pursuing her four year degree at University of Zambia. These teachers taught in English, but many times, these teachers spoke Nyanja to their students and with other colleagues. In general, these teachers reported that teaching in Zambia came with many challenges such as juggling ratio of students to teacher, wide range of literacy abilities, low achievement, lack of books and other materials, and lack of professional development.

Assessment Procedures

This study was conducted by the principal investigator and three additional research assistants. The principal investigator trained one of the research assistants who was an undergraduate student from the same university in the United States. The principal researcher did the following to prepare the research assistant: reviewed testing materials' purposes and objectives, modeled testing procedures, discussed fidelity of implementation, and finally required the assistant to administer each of the tests as a practice. Two additional Zambian research assistants joined and were trained by the principal investigator to administer only one-on-one measures, such as the WIAT II Spelling). The first Zambian assistant studied education at the University of Zambia and

the second assistant was retired and had taught primary school grades for 23 years. The combined training time for the Zambian assistants was approximately four hours.

Standardized tests given in English used primarily in the United States were used to measure students' spelling abilities, vocabulary, orthographic knowledge, morphological awareness, and sentence writing abilities. Tests were administered in the morning sessions for School A and afternoon sessions for School B. Tests were given in a separate room that was quiet and disconnected from the other classrooms in the school. Throughout the study, two observers assessed fidelity of testers' implementation via direct observation during 20% of each research assistant's testing administrations; IOA was 100% for each of them.

Tests using whole group administration included morphological derivational and decomposition knowledge, vocabulary, and sentence writing. Administrators read the morphemic measures to students as well as provided them the written form to avoid any word decoding conflicts. Spelling required individual administration. All measures, except morphemic measures, were administered in written form only. The same testing format was followed for all students in both schools: (a) provide a quiet setting, (b) pass out materials, (c) read directions, (d) monitor participants and time during testing, and (e) gather materials and secure testing materials. Testing spanned over a five week time period and included one or more of the following assessments: MA, spelling, vocabulary, sentence writing. Most tests required between 20-50 minutes. Students received pencils and were seated with ample space between them to prevent talking and cheating.

Instruments

In order to better understand the role of MA in writing ability, derivations and decompositions of morphologically complex words, spelling, vocabulary were measured, and a sentence writing activity focusing on morphemic accuracy, syntax, semantics and linguistic context.

Morphological derivational knowledge was adapted from Carlisle, 2000. Spelling was measured using Weschler Individual Achievement Test, 2nd edition (WIAT II; Weschler, 2005). Vocabulary was measured with Gates MacGinitie (1989) Grade 3 Blue form. Morphemic accuracy in sentence writing was measured using a researcher created measurement.

Decomposition and Derivational Knowledge. An adaptation of Carlisle´s (2000) morphological structure tests was used. The test included a range of derivational suffixes including high and low frequency (i.e., *-er, -ness, -al, -ly, -th*). The items include the following shifts between the derived and base form: 1) no orthographical or phonological shifts (i.e., *happily-happy*), 2) orthographic shift only (i.e., *reliable-rely*), 3) phonological shift only (i.e., *muscle-muscular*), and 4) both phonological and orthographic shifts (i.e., *depth-deep*). In the 28 item decomposition test, the derived word is given and the participant must decompose it to extract the target word (i.e., *(reliable) On his friend he could always <u>rely</u>*). In the 28 item derivational knowledge test, the participant was given the target word and expected to create a derived word (i.e., *(reason) Her argument was quite <u>reasonable</u>*). The target word along with the sentence

will be read aloud. Again, correct spellings of the stem and suffix should not include more than one phoneme deviation since the stem is provided (i.e., equluti for equality).

Vocabulary. Vocabulary was measured using the Gates MacGinitie (1989) Grade 3 Blue form. This subtest has a Kuder-Richardson Formula 20 reliability coefficient of .93. The Vocabulary test measures vocabulary ability needed for reading texts. Part of speech clues are given to help the reader determine how the word is used but no clues are given to help determine meaning.

Spelling. Spelling was measured with Weschler Individual Achievement Test 2nd Edition (WIAT II, 2005)**.** This sub test was used to measure written spelling of letter sounds and single words. Students hear each word twice and once read in the context of a sentence. Erasers are not used; students cross out words and spell the word to the best of their ability. Scoring stopped after four consecutive scores of zero. The reverse rule applied when a student did not obtain three consecutive scores of one (i.e., scoring 0 on any of the first 3 spelling words means administering preceding words in reverse order until student achieves 3 consecutive scores of 1). This test was administered individually. There is a strong inter-item consistency within subtests with reliability coefficients ranging from .80 to .98.

Sentence Writing. This measurement was created by the researcher. Each student was given 23 derived word forms (i.e., morphologically complex word) representing high and low frequency words and suffixes (e.g., hopeless, truthful, sadness, famous, collector, classify, and magical). The researcher also consulted with the teachers of the students represented in the study to determine cultural appropriateness of

potential words (e.g. chemist replaces pharmacist). Morphemic accuracy was defined as using the derived word with correct syntax (grammar) and word usage (semantics) with appropriate linguistic (contextual) content (e.g., ***lovely*** -- She had such a *lovely* smile – syntax, semantics, context are correct; ***weekly*** -- Our family goes to the zoo every *weekly* -- semantics and context are correct but wrong syntax). A sentence was discounted if written as a definition (i.e., ***Colorful*** means lots of colors), or if syntax and semantics were correct, but lacked linguistic or contextual development (i.e., That was ***magical***). In addition to correct semantics and syntax, this measure also included errors based on Green et al., (2003) to include the lack of or incorrect use of a morphological marker in an obligatory context. An obligatory context is the linguistic context which refers to the context's influences determining the necessary marker (e.g., ***-ly*** denoting an adverb not an adjective).

Results

Descriptive statistics were calculated to examine measures of central tendency and variability for the continuous measures focused in this study (See Table 7) and frequencies for categorical measures (See Table 1). Table 7 summarizes the descriptive statistics conducted on the raw scores for the continuous measures of interest.

Tests, subtests, and related measures were found to have means ranging from approximately .61 to .70. Average mean length of sentence was found to be slightly above 6.7 words, with the average age of approximately 12 years.

A 3-step hierarchical multiple regression was conducted to determine whether morphemic awareness contributed to writing sentences using linguistically complex words above and beyond that accounted for by demographic variables, vocabulary, spelling and mean length of sentence. The ability to craft sentences using morphologically or linguistically complex words correctly is a function of many literacy variables working in tandem. Scatter and residual plots revealed that the assumptions of normality, and linearity were all satisfied (Pallant, 2001). Homoscedasticity was assessed by means of scatterplots, and these implied satisfactory consistency of spread through the distributions. Tests for multicollinearity indicated a range of acceptable VIF levels (VIF = less than 1.7 for demographic variables, 5.835 for vocabulary, 4.974 for spelling, 1.997 for mean length of sentence, and 7.7407 for morphemic awareness). Results from Cook's distance (Cook, 1977) confirms that outliers (i.e., standardized residual is greater than 3.3 consistent with .001 alpha level) including both the dependent and independent variables were not detected. Centered leverage values were examined to

assess the distance of a value of the independent variable value is from the mean value, and all values were less than .1. Most demographic correlations were not significant except for SES and Maternal Education in step one. Moderate to strong correlations (e.g., .30 to 69) were found between the predictor variables morphemic awareness, sentence length, spelling, vocabulary, writing, SES, and maternal education. High correlations were found among vocabulary, spelling and morphemic measures mainly because these skills typically develop in tandem. Correlations between the independent variables are presented in Table 8.

The hierarchical regression model including all predictor variables is a statistically significant predictor of the outcome variable, morphemic accuracy in writing (See Table 9). Step one variables included family characteristics (maternal education, SES, and home language) and student characteristics (classroom assignments, gender, age). As shown in Table 10, the set of family and student characteristic control variables contributed significantly to the regression model (R^2= 20.6%, $F(1, 9) = 5.65$, $p < .001$) as compared to a model with no predictors. For model 1, only maternal education (see Table 11) was significantly associated with morphemic accuracy in writing in this model ($\beta = .371$, $t = 4.878$, $p < .001$).

Variables closely associated with writing ability were entered in Step two (Spelling, Vocabulary, and Sentence Length). Results, shown in Table 10, indicated that these variables accounted for an additional 54.9% of the variance in morphemic accuracy in writing $\Delta F (9,3) = 144.269$, $p < .001$. Results suggest that by developing spelling, vocabulary and ability to craft longer sentences could improve performance

using linguistically complex words correctly in writing. In Model 2, Vocabulary (β =.306, *t* =4.261, *p* <.001), Spelling (β =.426, *t* =6.269, *p* <.001), and Sentence Length (β =.238, *t* =4.765, *p* <.001) each was significantly associated with a student's ability to effectively use complex words correctly in well-constructed sentences. The aforementioned variables that are closely related to writing ability explained students' performance and abilities over and above maternal education, β =.024, *t* =.530, *p* <.001.

Morphemic Awareness, the variable of interest for this study, was added in Step 3 to understand its predictive ability over and beyond other variables was significantly associated with writing ability (ΔR^2 = .2.3%, ΔF (3,1) = 19.977, p < .001). In the final model, Morphemic Awareness recorded the highest beta value (β =.413, *t* =4.470, *p* <.001). Spelling (β =.250, *t* =3.301, *p* <.001), and Sentence Length (β =.212, *t* =4.419, *p* <.001) were also statistically significant. Vocabulary was not significant in Model 3, (β =.104, *t* = 1.268, *p* <.001). Results of the hierarchical multiple regression analysis provided confirmation of the research question.

Discussion

The primary purpose of this study was to examine the development of students' morphological skill in writing in light of research showing that morphemic awareness is associated with literacy achievement (Bowers, Kirby, & Deacon, 2010; Kuo & Anderson, 2006). Researchers have documented that morphemic awareness (i.e., understanding, analyzing and manipulating the smallest meaningful units of words) is predictive of students' writing ability (Apel & Diehm, 2014; Goodwin & Ahn, 2013;

Green, et. al., 2003). The findings of this study were consistent with those of previous studies demonstrating that MA is related to writing, spelling and vocabulary development (Anglin, 1993; Apel & Diehm, 2014; Nunes & Bryant, 2006). The key finding – that MA predicts writing ability among Bantu speaking children without explicit or systematic morphology teaching – argues to make morphology one of the key components in developing models of explicit writing instruction for ELLs in Zambia and surrounding English speaking nations facing similar issues. Studies highlighting ELLs, such as Kieffer and Lesaux (2008), demonstrate that the predictive power of MA increases from one grade to the next as written texts become more complex. Therefore, it is paramount that ELLs in Zambia enhance their awareness of and ability to manipulate words' linguistic architecture to facilitate vocabulary growth, spelling accuracy, and overall writing ability.

We used raw scores in all analyses because the Western standardized tests were normed with fluent English speaking students with school and learning experiences typical to America. Learning characteristics of the Zambian students in this study varied in age, maternal education, home language, SES, years in school, ratio of students to teacher, learning opportunities (e.g., having limited access to books at home or at school) and teaching style. The overall results signal that morphemic awareness is emerging and is contributing to writing ability. These Zambian ELL students demonstrated developing patterns of progression using derived words.

The hierarchical multiple regression demonstrates that MA contributed 2.3% above and beyond other literacy variables (e.g., spelling, vocabulary) in students' ability

in writing sentences with derived words. It can be argued that by providing explicit MA instruction, this percentage could increase. Both spelling and sentence length are significant in all three regression models signaling their implication for effective transcription (spelling) and text generation (word retrieval and syntax or sentence construction) in writing (Berninger & Swanson, 1994; Hayes & Flower, 1980). Research shows us that morphemic awareness plays an integral part in both transcription (e.g., Bryant, Deacon, & Nunes, 2006; Deacon, Kirby, & Casselman Bell, 2009) and text-generation (e.g., Carlisle & Stone, 2005; Green et al., 2003). Our findings also aligned with other studies (e.g., Nunes, Bryant, & Bindman, 1997a; Rosa & Nunes, 2008) showing a strong relationship between spelling and writing ability: Writers who have to stop and think about spelling are using cognitive resources that could be otherwise used for higher level thinking required for effective writing to occur, such as word choice, organization, and ideas. MA facilitates spelling because it forces the child to be aware of smaller meaningful units within words and how these units change (Deacon, Kirby, & Casselman-Bell, 2009). Vocabulary is statistically significant in the first and second models, but marginally significant in the third model. A plausible reason could be that students were provided with specific words to use in the sentence writing activity as opposed to generating complex words as seen in spontaneous writing. We are limited in our understanding of how these students use complex words. Participants were expected to generate syntactically and semantically correct sentences using only the words provided to them, so we can infer the range of experience with complex words based on those words only.

Before beginning the study, the researchers piloted narrative writing prompts with 25 random students from different classrooms (e.g., "Write about a special person in your life who has helped you"). However, the results indicated that there were not sufficient number of complex words to analyze and in many cases none were used at all. Many of the students' essays contained fewer than four sentences. The students in this study typically did not engage in writing essays. Their writing experiences consisted largely of answering questions with one to two sentences.

The researchers then aimed to examine writing ability at the sentence level by providing derived words whereby students generated sentences supporting the meaning of the word. By doing this, the students were able to demonstrate evidence of knowing a range of derived words. The word had to be used in the form that was provided (e.g., *weekly* could not be transformed to *week*). Furthermore, morphemic accuracy was used as an index to record (1) correct syntax, (2) word usage and (3) appropriate contextual content (e.g., "My sister is very jealous." Contextual content is poor because there is no reference to what or to whom the sister is jealous, although the word is used correctly both syntactically and semantically). In addition, nearly all of the derived words for the writing activity contained phonologically transparent base words. Phonological transparency means that the base word maintains its pronunciation and typically easier to spell and read (e.g., *happy-happiness* unlike *piano-pianist*).

Common errors included students using simple sentence structures and not adding contextual details to support the word's meaning (e.g., *I need happines*). Some sentences reflected possible native language interferences (e.g., *That girl is player; Be*

careful wene you are gowin at the road). However, these are typical and acceptable errors among ELLs and demonstrate emerging understanding of English semantics and syntax. Semantic errors were common among this sample of ELLs, but there were incidences in which students identified part of speech signaling an understanding of certain suffixes and syntax (e.g., *I am a discussion*). In other cases, the error was associated with not knowing the word's meaning (e.g., *I was very decision*). A common error among these students signaled they were demonstrating some level of semantic understanding but lack of syntactical or grammatical knowledge (e.g., *That girl is a very privacy girl; Her father is a sadness person in there family)*.Other errors were associated with using the target complex word correctly (*dentist*), but confusing other complex words such as with using *pain* instead of *hurt* (e.g., *My teeth is paining, where is a dentist?*). Although *paining* was erroneously written, this student is demonstrating a generalization of inflectional knowledge by applying the *–ing* correctly. Other errors illustrated students' semantic understanding but apparent deficits with respect to suffixes signaling grammatical markers, such as *–al* signals an adjective (e.g., *The man was doing magical*). Moreover, it is likely that explicit instruction and practice could increase their awareness of morphemes to distinguish suffixes and relate the base words (e.g., *private-privacy*). Both MA and sentence writing were highly correlated (r = .85) which is not surprising knowing that MA helps writers with parts of speech which signal verb, noun, adjective, and adverb positions (e.g., *fame –famous;* the *–ous* signals an adjective in this case).

Average sentence length was around seven words (*M*= 6.8, *SD*= 1.72), and

morphemic accuracy in writing was slightly below 70% (*M*=.69, *SD*=.137). Spelling, vocabulary, and MA scores were also below 70% indicating students need more exposure to and practice with written and oral English (Perfetti & Hart, 2001; Reichle & Perfetti, 2003). In the decomposing test, students struggled with correct spelling of words containing orthographical shifts, such as *division –divide*. However, there was strong evidence that their morphemic knowledge was helping them parse out base words when decomposing and making associations between words sharing the same base. In nearly all the cases involving spelling multi-morphemic words with final consonant clusters (e.g., *absorbed, rained*), students' attempts typically included both morphemes signifying more than a chance level of an implicit understanding that these kinds of words contained two morphemes. Most students used phonetical spellings which are typical among children learning to spell and for ELLs (e.g.,*accep-accept; discus-discuss; continu-continue*). Noteworthy, these students spoke with a British accent where the /r/ was dropped in r-controlled words and the spelling reflects the phonological characteristics (e.g., *popula –popular; danga-danger*). The results support a more general association between MA and the spelling of a range of words.

Limitations and Future Directions

This study has some limitations that reduce the potential of its conclusions but offers suggestions for further research. To begin, the writing task provided specific derived words to be used in sentences. Therefore, we cannot draw conclusions concerning students' ability to use a range of derived words in written form. Moreover, since many of these students were struggling readers, providing a phonemic awareness

measure could have provided some further insight into their literacy abilities. On another note, to better understand how MA develops among this population, longitudinal research could be used to explore growth over a given time period by collecting additional data and using individual growth modeling. Another limitation points to incorporating 206 6^{th} grade students from two schools but with only 25 students representing the second school. Another angle that this study could have benefitted from is by incorporating more classrooms from School B to explore the strengths and weaknesses by nesting classrooms with HLM. Although data was collected using culturally sensitive measures (Zambian Achievement Test), this data was not included for this study. The ZAT data could provide additional understanding of other strengths and/or weaknesses of these students.

The research here offers a beginning step toward understanding MA development and its predictive ability among Zambian students. Nearly all MA related studies are conducted in developed nations whose economies can support research and resources to advance diversified learners. This study provides a beginning to understand the critical role of morphemic awareness facilitating spelling, writing, and vocabulary among children in Sub-Sahara Africa. These results are promising and demonstrate that these students are tapping their understanding of morphemic awareness to help them write and spell. Therefore, we propose that further experimental research be conducted with at-risk students and students with known learning disabilities or below grade level. To date, experimental research focusing on MA instruction has not been conducted among Sub-Sahara African populations and is warranted to help increase students' overall English

literacy achievement. Although the money is limited for resources in Zambia and classroom sizes are large, it can be argued that future studies that focus on preparing teachers, tweaking instruction, increasing learning opportunities, and explicitly teaching morphology in context of reading and writing, students could make greater literacy gains that will prepare them for the competitive world and global economies.

CHAPTER IV

CONCLUSION

Most of the 250 million children in the world who struggle with basic literacy skills are living in Sub-Sahara Africa (UNESCO, 2014). Reading comprehension is critical skill for all children to acquire. Understanding written and oral language serves as a conduit for successful communicative interactions. Sadly, student achievement has taken a downward trend in critical areas such as basic reading skills (SECMEQ, 2010). According to this report, almost half of 6th graders in Zambia were performing at pre- or emergent reading levels and only 29% demonstrated basic reading skills. Without basic literacy skills, these students will be limited in number of opportunities to progress, develop and contribute to society. The call of attention to the literacy deficit conundrum and demand to intervene are both paramount. In taking first steps in answering this call, the present dissertation studies provide valuable information that practitioners and researchers can use to think about ways that morphemic awareness can be addressed and taught explicitly to help all students.

Results from these studies in this dissertation align with studies conducted in developed and resourceful nations, revealing morphemic awareness' predictive value over and beyond other known variables. The findings extend our understanding in that these students were naturally tapping metalinguistic resources in the absence of explicit instruction or research based interventions helping them and in a second language. Morphemic awareness has been well documented in its fundamental role in supporting

word reading, comprehension, spelling, writing, and vocabulary acquisition (Anglin, 1993; Bowers & Kirby, 2011; Carlisle, 2000; Deacon & Dhooge, 2010; Nunes & Bryant, 2006). Moreover, morphemic awareness forces readers and writers to be attentive to a word's linguistic architecture. Just like using Legos to build a structure, children discover that words come in attachable and detachable pieces that can be manipulated and shared with other words. Syntactic knowledge grows stronger when children are able to understand that derivations signal part of speech, too. Vocabulary increases as children ascertain new word meanings when they pinpoint base words and meanings of suffixes in new contexts. Additionally, morphemic awareness complements orthographic knowledge and spelling by strengthening attentiveness and knowledge of how smaller units are constructed (e.g., *-ous*, *-ness*, *-ity*) as well as base word changes with derivations (e.g., *deep-depth*).

Although there is evidence that students were tapping morphemic awareness to spell, decode, write, and read, they struggled greatly with basic reading comprehension and sentence writing. Standardized measures, leveled for second grade, were used with students' scores averaging below 70% for reading comprehension (M=.61; SD=.14) and writing (M=.68; SD=.13). In fact, students attained below average scores on spelling, word reading, derived and decomposed words, and orthographic knowledge measures. The attempts that students made spelling, reading and using derived words in sentences provided evidence that their knowledge was at best emerging (e.g., *performimse-performance; deith-depth; permition-permission; swimmar-swimmer; absorbshon-absorption*). In addition, students manipulated various suffixes onto base word forms in

the derivational measure, although the combinations were frequently erroneously matched or formed (e.g., *teach – teachar; assist-assistment*). At times, the derived word was not known at all but rather random attempts were made by attaching any known suffix (e.g., *deep-deeple; humor-humorer*). ELLs, in general, struggle considerably with vocabulary and English orthography, but morphemic awareness provides a pathway for readers to make approximately three word associations for each new word learned as opposed to memorizing 170,000 to 200,000 morphologically complex words they will encounter in academic contexts (Nagy & Anderson, 1984).

Lastly, we need to be reminded that most research that examines effective reading and writing practices has been conducted in countries that developed and whose economies support research (Trudell & Schroeder, 2007). Although English is considered a globalized language, it may not serve as the most effective model to teach children to read and write, mainly because its orthographic system differs considerably with that of Bantu languages (e.g., Nyanja). English is a prevalent language of instruction throughout the African continent and challenge children learning to read largely because they are less transparent than Bantu languages. Ziegler and Goswami (2006) point that English is a more challenging language to learn to read because "…to decode the most frequent 3000 monosyllabic English words at the level of the rime, a child needs to learn mappings between approximately 600 different orthographic patterns and 400 phonological rimes, far more than would be needed if the child could simply learn how to map 26 letters onto 26 phonemes" (p. 431).

Next Steps

Understanding the advantages of morphemic awareness in augmenting overall literacy ability only makes the argument stronger for morphemic awareness to be explicitly and methodically taught incrementally throughout each academic year especially beginning in upper elementary years to students in Zambia and other nations who share similar struggles (Apel & Diehm, 2014; Bowers & Kirby, 2011; Carlisle, 2010; Goodwin & Ahn, 2013). Additionally, there is a scarcity of research involving students with learning disabilities in Sub-Sahara African nations. With this being said, experimental research meeting evidence based standards focusing on instruction and interventions is warranted to document its benefits among this population of students. To leverage students' knowledge about morphemes, effective instruction and interventions should focus on part(s) to whole or vice versa (e.g., *magic* adding parts: *magical, magically*), affix meanings, multi-morphemic words (e.g., *ecological, sensitive*), syntactic and semantic markers, and word families with same bases.

Next steps for research to consider among this population include: (a) identifying and/or creating an evidenced based morphemic awareness intervention that trains students to understand and manipulate morphemes in that will lead to proficiency in reading, spelling, writing, and vocabulary; (b) constructing a manual to guide professional development of teachers and pre-service teachers in Zambian universities; (c) teaching fidelity of implementation of the intervention to teachers, pre-service teachers, and administrators; (d) creating ongoing training practices and support to uphold fidelity of implementation of intervention conditions; (e) forming a conduit to

train teachers in partnering schools; (f) providing support and helpful ways for parents (both literate and illiterate) to exercise with their student; (g) maintaining strong relations with university faculty, school faculty and parent organizations; (g) and, establishing a data collection timeline and publication goals. With these elements in place, it is possible to produce a cost effective way to improve morphemic awareness without relying on expensive resources and bootstrap literacy skills among this population.

Along the same lines, no published single case studies exist among this population. Research has already established that students benefit from interventions that incorporate explicit, systematic, and effective based instruction to teach morphemic awareness. Another direction that future research needs to consider is teacher preparation. Although many times unidentified, there are many children who may suffer emotional disturbances or other problems associated with the high incidence of AIDs, AIDs related deaths in families, and abject poverty. The research community could also benefit from understanding learning behavior in different contexts.

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APPENDIX

Table 1

Frequencies of Categorical Variables for Both Studies

Languages	*N*	%
Nyanja	131	63.6
Bemba	55	26.7
Tonga	20	9.7
Total	206	100.0
SES		
< 300USD	59	28.6
300 to 800	125	60.7
>800	22	10.7
Total	206	100.0
Maternal Education		
No formal education	9	4.4
Primary	95	46.1
Middle school	64	31.1
Highschool	23	11.2
University	15	7.3
Total	206	100.0
Gender		
Female	98	47.6
Male	108	52.4
Total	206	100.0
Class Distribution		
Classroom1	44	21.4
Classroom2	46	22.3
Classroom3	46	22.3
Classroom4	43	21.4
Classroom5	25	12.6
Total	206	100.0

Table 2

Descriptive Statistics for Reading Comprehension

	N	Min	Max	Mean	Std. Deviation
MA	206	.5	1.0	.69	.12
Vocab	206	.40	.95	.61	.13
Reading	206	.40	.94	.61	.14
WordRdg	206	.42	.95	.65	.13
Orthographic	206	.42	.97	.65	.13
Age	206	10	14	12.00	.93
Valid N (listwise)	206				

Table 3

Correlations of Predictor Variables on Reading Comprehension

	Rdg	Home Lg	Age	Gender	SES	Mat Ed	Voc	Wd Rdg	Orth	MA
Rdg	1.00	.037	-.068	.012	.361	.451	.874	.840	.878	.910
HomeLg	.037	1.000	-.031	-.114	-.024	.012	.024	.024	-.020	.042
Age	-.068	-.031	1.00	.000	.069	.096	-.021	-.040	-.079	-.054
Gender	.012	-.114	.000	1.000	.087	.074	.019	.022	.049	-.023
SES	.361	-.024	.069	.087	1.000	.515	.381	.354	.345	.372
MatEd	.451	.012	.096	.074	.515	1.000	.460	.410	.463	.417
Vocab	.874	.024	-.021	.019	.381	.460	1.000	.820	.869	.896
WdRdg	.840	.024	-.040	.022	.354	.410	.820	1.000	.832	.865
Orth	.878	-.020	-.079	.049	.345	.463	.869	.832	1.000	.897
MA	.910	.042	-.054	-.023	.372	.417	.896	.865	.897	1.000

Table 4

ANOVA of Models with Reading Comprehension as Dependent Variable

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.044	5	.209	12.744	.000[b]
	Residual	3.278	200	.016		
	Total	4.323	205			
2	Regression	3.629	8	.454	128.704	.000[c]
	Residual	.694	197	.004		
	Total	4.323	205			
3	Regression	3.724	9	.414	135.371	.000[d]
	Residual	.599	196	.003		
	Total	4.323	205			

a. Dependent Variable: Reading

b. Predictors: (Constant), MaternalEd, HomeLang, Age, Gender, SES

c. Predictors: (Constant), MaternalEd, HomeLang, Age, Gender, SES, WordRdg, Vocab, Orthogrphic

d. Predictors: (Constant), MaternalEd, HomeLang, Age, Gender, SES, WordRdg, Vocab, Orthogrphic, MA

Table 5

Model Summary for Reading as Dependent Variable

				Std.	Change Statistics					
Model	R	R^2	Adj R^2	Error of the Est	ΔR^2	ΔF	df1	df2	Sig. ΔF	Durbin-Watson
1	.492[a]	.242	.223	.12	.242	12.74	5	200	.000	
2	.916[b]	.839	.833	.05	.598	244.41	3	197	.000	
3	.928[c]	.861	.855	.05	.022	31.14	1	196	.000	1.862

a. Predictors: (Constant), MaternalEd, HomeLang, Age, Gender, SES

b. Predictors: (Constant), MaternalEd, HomeLang, Age, Gender, SES, WordRdg, Vocab, Orthographic

c. Predictors: (Constant), MaternalEd, HomeLang, Age, Gender, SES, WordRdg, Vocab, Orthographic, MA

d. Dependent Variable: Reading

Table 6

Hierarchical Regression Analysis for Predictors of Reading Comprehension

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.591	.119		4.957	.000
	HomeLang	.007	.014	.030	.483	.629
	Age	-.018	.010	-.116	-1.867	.063
	Gender	-.008	.018	-.028	-.455	.649
	SES	.044	.017	.182	2.522	*.012
	MaternalEd	.055	.011	.371	5.142	*.000
2	(Constant)	-.016	.061		-.260	.795
	HomeLang	.006	.006	.028	.951	.343
	Age	-.004	.005	-.025	-.875	.382
	Gender	-.005	.008	-.018	-.616	.539
	SES	.003	.008	.011	.324	.747
	MaternalEd	.004	.005	.024	.659	.511
	Vocab	.365	.066	.349	5.562	*.000
	WordRdg	.253	.059	.238	4.304	*.000
	Orthogrphic	.400	.072	.362	5.548	*.000
3	(Constant)	-.070	.057		-1.224	.222
	HomeLang	.003	.006	.014	.521	.603
	Age	-.004	.004	-.024	-.876	.382
	Gender	.001	.008	.004	.161	.872
	SES	-.002	.008	-.008	-.241	.810
	MaternalEd	.007	.005	.045	1.328	.186
	Vocab	.200	.068	.191	2.941	**.004
	WordRdg	.131	.059	.123	2.227	***.027
	Orthogrphic	.217	.075	.196	2.908	**.004
	MA	.511	.092	.438	5.581	*.000

Dependent Variable: Reading Comprehension
N = 206; *$p \leq .001$, **$p \leq .01$, ***$p \leq .05$

Table 7

Descriptive Statistics for Writing Variables

	N	Range	Min	Max	Mean	Std. Deviation
MA	206	.6	.5	1.0	.692	.12
Vocab	206	.55	.40	.95	.618	.13
Spell	206	.49	.40	.89	.621	.13
Sent Length	206	8.90	3.50	12.40	6.763	1.72
Writing	206	.55	.43	.98	.68	.13
Age	206	4	10	14	12.00	.93
Valid N (listwise)	206					

Table 8

Correlations of Predictor Variables for Writing

	Wrtg	Home Lg	Age	Gender	SES	Mat Ed	Voc	Spell	Snt Lgth	MA
Wrtg	1.00	-.015	-.069	.049	.294	.403	.806	.817	.680	.84
HomeLg	-.015	1.00	-.031	-.114	-.024	.012	.024	.091	-.009	.04
Age	-.069	-.031	1.00	.000	.069	.096	-.021	-.047	-.033	-.05
Gender	.049	-.114	.000	1.00	.087	.074	.019	.006	.091	-.02
SES	.294	-.024	.069	.087	1.00	.515	.381	.300	.361	.37
MatEd	.403	.012	.096	.074	.515	1.00	.460	.390	.429	.41
Voc	.806	.024	-.021	.019	.381	.460	1.00	.841	.633	.89
Spell	.817	.091	-.047	.006	.300	.390	.841	1.00	.604	.88
SntLgth	.680	-.009	-.033	.091	.361	.429	.633	.604	1.00	.63
MA	.846	.042	-.054	-.023	.372	.417	.896	.881	.634	1.00

Table 9

ANOVA of Models with Writing as Dependent Variable

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.17	9	.130	8.10	.000[b]
	Residual	3.15	196	.016		
	Total	4.32	205			
2	Regression	3.56	11	.324	82.71	.000[c]
	Residual	.76	194	.004		
	Total	4.32	205			
3	Regression	3.73	12	.312	102.94	.000[d]
	Residual	.58	193	.003		
	Total	4.32	205			

a. Dependent Variable: Reading

b. Predictors: (Constant), SES, HomeLang, Age, Gender, , MaternalED,

c. Predictors: (Constant), SES, HomeLang, Age, Gender, MaternalED, WordRdg, Vocabulary

d. Predictors: (Constant), SES, HomeLang, Age, Gender, MaternalED, WordRdg, Vocabulary, MA

Table 10

Model Summary with Writing as Dependent Variable

					Change Statistics					
Model	R	R^2	Adj R^2	Std. Error of the Estimate	ΔR^2	ΔF	df1	df2	Sig. ΔF	Durbin-Watson
1	.45[a]	.20	.16	.12	.20	5.64	9	196	.000	
2	.86[b]	.75	.74	.07	.54	144.26	3	193	.000	
3	.88[c]	.77	.76	.06	.02	19.97	1	192	.000	1.79

a. Predictors: (Constant) SES, HomeLang, Age, Gender, class4, class2, MaternalEd,

b. Predictors: (Constant), SES, HomeLang, Age, Gender, MaternalEd, Spell, SentLength, Vocab

c. Predictors: (Constant), SES, HomeLang, Age, Gender, MaternalEd, Spell, SentLength, Vocab, MA

d. Dependent Variable: Writing

Table 11

Hierarchical Regression Analysis for Predictors Associated with MA in Writing

Model		Standardized Coefficients			Collinearity Statistics	
		Beta	*t*	Sig.	Tolerance	VIF
1	(Constant)		5.77	.000		
	HomeLang	-.01	-.21	.831	.97	1.02
	Age	-.08	-1.29	.198	.94	1.06
	Gender	.01	.17	.861	.97	1.03
	SES	.10	1.43	.152	.72	1.38
	MaternalEd	.37	4.87	*.000	.70	1.42
2	(Constant)		2.68	.008		
	HomeLang	-.06	-1.68	.093	.96	1.04
	Age	-.03	-1.06	.287	.93	1.06
	Gender	.01	.37	.708	.95	1.04
	SES	-.04	-1.06	.288	.69	1.44
	MaternalEd	.02	.53	.597	.60	1.66
	Vocab	.30	4.26	*.000	.24	4.06
	SentLength	.23	4.76	*.000	.50	1.96
	Spell	.42	6.26	*.000	.27	3.63
3	(Constant)		1.55	.121		
	HomeLang	-.057	-1.641	.103	.959	1.04
	Age	-.029	-.825	.410	.932	1.07
	Gender	.032	.908	.365	.947	1.05
	SES	-.067	-1.623	.106	.682	1.46
	MaternalEd	.032	.733	.464	.600	1.66
	Vocab	.104	1.268	.206	.171	5.83
	SentLength	.212	4.419	*.000	.501	1.99
	Spell	.250	3.301	*.001	.201	4.97
	MA	.413	4.470	*.000	.135	7.40

Dependent Variable: Morphemic Accuracy in Writing
$N = 206$; $*p \leq .001$